THE FOUNDRY

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Semimonthly

Castings Pump Gasoline for Thirsty Automobiles

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Day and Night, the Filling Station Is Selling the Product of the Refinery

Find Where Castings Can Be Sold

CONTENTS

One Solitary Sour Fife Spoils the Sweetest Symphony 551

What Is Wanted of the Purchasing Agent?—By John C. Dinsmore 553

Use Crude Methods To Extract Oil—By Werner G. Smith 555

Cast Aluminum Washer Tubs—By Pat Dwyer 556

Refining Metals Electrically—By Larry J. Barton 560

How Good Is Your Memory for Faces? 564

Bill Considers a New Foundry Product—By Pat Dwyer 567

Broaden Service of Testing Society 570

Discuss International Arbitration Bar 571

High Temperature Considered 571

Direct Attention to X-Ray Studies 572

Make Radiator Sections on Synchronized Traveling Conveyors—By R. J. Heisserman. 573

Selling Aluminum Castings Direct 575

Report Status of Sand Tests—II—By H. Ries 576

Distributing the Burden of Overhead—By H. P. Keeler 580

Collects Sand Samples in His Spare Time 581

How and Why in Brass Founding—By Charles Vickers 566

The Shakeout 582

Trade Outlook in the Foundry Industry 583

Personals 584

Equipment Market Report 588

What the Foundries Are Doing 589

New Trade Publications 590

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What Is Wanted *of the Purchasing Agent?*

By John C. Dinsmore

AN ARTICLE which appeared in the Feb. 15 issue of THE FOUNDRY is a most interesting statement of the case of the foundry salesman. The attitude of A Victim is biased and many of his statements are based upon misinformation. His first complaint is that the purchasing agent is lacking in cordiality. Any student of psychology would have told A Victim that the attitude of the purchasing agent is a direct reaction caused by the true attitude of the salesman. The salesman in this case begins the interview without an open mind. He dislikes the whole tribe of purchasing agents and regards them as a necessary evil. While he has that thought floating around in the back of his mind, it is impossible to impress the purchasing agent favorably.

Character Shows Through

It makes no difference how much he may smile and smirk, his true feelings toward the purchasing agent are bound to show through like the cotton back on a shoddy coat sleeve. Under the circumstances, it is to be expected that the seamy side of the purchasing agent's nature will show up. Bear in mind that the purchasing agent sits at the opening of the funnel through which his firm's gold flows and it is up to him to spend the firm's money so as to secure the greatest ultimate value and economy. When a vendor calls who dislikes all purchasing agents but tries to substitute flattery for sincerity, the purchasing agent is put on his guard and may be watching his caller too closely to try especially hard to be cordial.

The purchasing agent must consider four distinct values in placing every order. His first concern is to see that the price he pays bears a definite relationship to the production cost of the materials he buys. To do this he must have a fairly accurate idea as to the vendor's raw material and labor costs. He depends upon the seller to give him this data and he expects to check it back.

His second consideration is to make sure that the vendor's price not only bears the proper relationship to the cost of production, but that these production costs are based upon good practice and are as low as they should be.

His third prime object is to so conduct each one of his deals that each will add to and not subtract from that most valuable intangible asset commonly called good will.

His fourth object is to secure reasonably good service.

Analyzing the attitude of the seller, we find that he approaches the purchasing agent with contempt and dislike in his heart, with scanty knowledge concerning his own production costs and a general lack of information concerning the costs and selling prices of his competitors. Since his cost data is incomplete, and since he asks a price that he hopes to get, but makes it plain at once that he can afford to take less, the purchasing agent would be remiss in the obligation to his firm if he did not secure the lower price. Someone is going to get a lower price from this seller and surely it may as well be he.

We are not particularly interested in the analysis of the proper term for the work of the purchasing agent. The salesman likes to be considered an ambassador of business and the purchasing agent likes to be taken sincerely. Our interest lies in pursuing the discussion in hand to the exclusion of such matters.

A Victim says, "often, an appropriation is made for the purchase of castings at a definite price and the purchasing agent is given a certain percentage, ranging from 10 to 50 per cent of all he saves out of this amount by securing castings at a lower figure."

I only wish that were true.

If this practice were to be adopted generally more purchasing agents would spend their vacations in Florida and fewer would drive Fords. I've made an intensive study of the whole price fabric for many years and I'm firmly convinced that prices are fixed not by cost of production, but by what the traffic will bear.

My relationship with the members of the National Association of Purchasing Agents has been so extensive and so intimate that I feel that I may speak with a degree of authority on this matter. Never have I known of a purchasing agent who was given a bonus for cutting unit costs. One of our frequent complaints is that it is so difficult accurately to measure the production of the purchasing department. We would welcome any fair device for measuring and recognizing our contribution to our firms, our institutions and our communities.

The prices asked for almost any commodity vary according to the relative bargaining ability of vendor and the purchasing agent. Production costs vary with the volume of business and the skill of the management. Both sides are protecting their own interests. If the purchasing agent can retain the good will of the chap who sells castings only by paying him a price that will not net the vendor "a good profit", then it were better forfeited. Paying the asking price means an artificial lightening of the economic burden of the vendor and putting the buyer's own firm at a distinct disadvantage in competing for business. Great advancement in the mechanical production of goods in any line is seldom found when the seller bears an artificially lightened economic load.

Some of the practices attributed to the purchasing agent are wholly to be condemned. The modern purchasing officer regards his reputation for unvarying veracity and integrity as one of his most valued assets. However, this does not mean that he should always tell all he knows. For the seller to inquire concerning the other bids which may have been submitted is as much to be condemned as the reported practice of certain purchasing agents of quoting fictitious prices.

When we boil it all down we find that A Victim is disgruntled because he has not succeeded in getting a price for his castings that would pay him "a good profit." He has been out-generaled and he is unhappy about the whole transaction.

Just how far any purchasing agent may justifiably go in the process of forcing prices down, of course must be determined by the circumstances. Each day new data are secured, which substantiate the belief that without the careful operation of the purchasing agent, without the judicious application of pressure on prices, that the cost of commodities and consequently the whole cost of living would tend to become unduly burdensome.

Presents Purchasing Agents' Side of the Problem

WHEN a series of articles, starting with Feb. 15 issue of THE FOUNDRY *gave an outline of the difficulties which confront the foundryman in selling castings and refering particularly to the feeling existing between the seller and buyer of castings, a number of comments were received. Realizing that two sides exist to every business relation, John C. Dinsmore, University of Chicago, was invited to prepare this and two articles which will follow, giving the purchasing agents' slant on the questions raised.*

MR. DINSMORE, who was graduated from the University of Chicago in 1911, has been purchasing agent of that institution since 1913. He has been lecturer and assistant professor on commercial organizations in the university and lecturer in purchasing at Northwestern university, is editor of the University Purchasing Guide and the Chicago Purchasing Agent and was at one time counselor for the department of purchasing practice of the Institute of American Meat Packers. Mr. Dinsmore is secretary of the Purchasing Agents' association of Chicago and vice president of the National Association of Purchasing Agents.

Use Crude Methods To Extract Oil

Chinese Follow Customs of Ancestors in Extracting Chinawood Oil—10,000,000 Gallons Used Annually in America

By Werner G. Smith

WERNER G. SMITH, president, Werner G. Smith Co., Cleveland, recently returned from a trip through China where most of his time was spent in studying Chinese vegetable oils, particularly wood oil. He journeyed 1600 miles up the Yangtze river to Chung King, in the bandit infested interior. Mr. Werner found that Chung King was not so important as a wood oil center as he expected, since most of the oil produced there finds its way through native channels to Wanhsien. On his way down the river he stopped several days at Wanhsein, where he visited a wood oil mill and inspected the grinding, treating and pressing of oil. In the accompanying article he describes the crude methods of the Chinese in extracting this oil, which is used in the manufacture of core oil in America.

CHINAWOOD oil, of which 10,000,000 gallons are used annually in America, is made from a nut about the size of a chestnut, three to eight nuts growing in a thick husk resembling a black walnut husk. The oil content of the nut is between 40 and 50 per cent by weight, but there is much waste in extraction. The Chinese method used at the mill at Wanhsien and at other mills is exceptionally crude.

The nuts first are placed over a rough stove and toasted. This burns off the thin skin that encases the nut and also softens it so that it may be ground more easily and the oil more readily pressed out. This method of heating the nuts is quite harmful to the oil, a fact that is common knowledge to all except the Chinese, since it changes the color of the oil to a reddish hue. If toasting were eliminated, a white oil such as medicinal castor oil or Russian white mineral oil would be produced.

However, the Chinamen will not admit this fact. They reason that toasting has been a part of the process for generations, and must be a necessary step or their grandfathers and fathers would not have done it. In spite of many queries, the only answer elicited from the mill owner was "We heat the nuts to get the oil out." It is likely that in all of the years he has been toasting wood oil nuts, he never has wondered why the operation is performed. He was taught to roast nuts, that being a sufficient reason for continuing.

After the nuts, which were buff colored at the start, have been charred black, they are ready for crushing. The stove over which they are roasted is made of stone, stands 3 feet from the ground, and is 4 feet wide and 6 feet long. A small fire door 8 inches square is in the front near the floor. The top of the stove is made of bamboo strips 1-inch wide and ½-inch apart. The stove has no chimney, the smoke and heat coming up through the webbing over the top. The nuts are piled on the top to the thickness of about 1-foot or more and are stirred from time to time to allow all of the nuts to be toasted about the same amount.

The stone grinding mill and the ancient ox are used in the grinding. The stone is 12 feet in diameter and 8 inches thick. At the outer edge a groove the shape of a wedge is chiseled, the groove being six inches wide and 4 inches deep. The nuts are placed in this wedge shaped groove.

A loose axle is located on the top of the center of the grinding mill and is connected to a long pole extending sufficient length for the ox to be hitched to it. Attached at right angles to this pole and extending downward directly over the trough in the big stone is a short but sturdy pole at the end of which is attached a heavy disk. This disk runs along the trough and grinds the toasted nuts to powder. Heavy stones are placed on top of the pole, some directly over the grinding disk, but principally over the axis of the stone, thus giving sufficient weight to the grinding disk.

The ox is equipped with blinders so that he does not know that he is going round and round. As he plods methodically round and round, the disk grinds the nuts and a short stick like a rudder which is fastened behind the disk, keeps the nuts and meal in the groove thoroughly mixed to equalize the grinding.

After leaving the grinding mill the meal is passed through a close meshed bamboo screen. The meal passing through the screen is of the coarseness of flax seed meal ready to be pressed. The remainder is returned to the mill for further grinding. The fine meal is placed on a burlap mat over a cone shaped stove. Beneath the burlap and directly over the fire is a pot of boiling water which steams the meal through the burlap. This steaming brings out the mucilaginous matter and makes it possible to press the meal into a cake ready for the oil press. The cake is made by first placing a quantity of straw on the floor, then two iron rings about 10 inches in diameter into which the meal is placed. The ends of the straw are brought over the top of the meal and tamped firmly into the cake.

The press is made from a large log 10 feet long which has been skinned of all bark and hewn so that the depth is twice the width. The center is dug out so that the log is hollow about two-thirds of its length. The meal cakes are placed sideways in this hollow, about a dozen cakes being inserted. Heavy wooden blocks are inserted at the upper end, the press being on a slight tilt. Heavy wooden iron-capped wedges are driven between these blocks. A heavy iron-capped pole about 12 feet long and 8 inches in diameter is suspended from the ceiling and is used as a ram.

This ram is swung as a pendulum two or three times to gain speed, and then with a fiendish gutteral cry, the attendant drives the ram against the wedges. The driving continues until the wedges are flush with the presses, at which time it is supposed that all of the oil has been squeezed from the cakes. The oil drops through a hole in the bottom of the press into a bamboo paper lined and varnished basket. The oil then is ready for the market.

Art J. Kies, formerly vice president of the Great Lakes Foundry Sand Co., Detroit, has accepted a position with the Enterprise Sand Co., Pittsburgh, miners and producers of molding sand. He will represent that company in Michigan, Indiana, Illinois and Western Ohio.

Cast Aluminum

Through Installation of Mechanical Handling Sand, Molds and Castings

Fig. 1—Tub molds are closed on the conveyor

IMPORTANCE of selling methods in disposing of a product was presented in the June 15 issue of THE FOUNDRY as one of the two main pillars on which the success of the Maytag Co., Newton, Iowa, is supported. Several of the principal features of the second pillar, an adequate manufacturing plant, are shown in the accompanying illustrations. True, the new aluminum foundry occupies only a relatively small space in comparison with the floor area of the entire manufacturing plant, but since it is the first department through which the raw material passes on its way from incoming to outgoing railroad cars, it may be referred to appropriately, if not as a pillar, at least as the foot of the pillar. The foundry was designed, erected and equipped for the express purpose of making all the aluminum castings that enter into the construction of a washing machine exploited by the Maytag Co. The great selling feature of this machine is that it does much of the household work mechanically that formerly was performed by hand at the expense of tired backs and aching muscles. Therefore it is only natural to find that the same executives who counted on this feature to sell the goods, also should look with favor on modern equipment and methods that relieve foundry workers of a great deal of their burden. Power in some form is applied mechanically to nearly every one of the operations involved in making the castings. The result is a satisfied group of workmen, a negligible labor turnover, a casting loss from all causes of less than 6 per cent, economical operation and an exceedingly large output whether reckoned on a per man basis or upon the basis of a square foot of floor area.

R. W. McIlvaine Co., Chicago, designed and installed the sand conveying and distributing equipment, the power driven conveyors on which the molds are assembled and poured and the auxilliary equipment used in connection with the batteries of molding machines. Part of the equipment is located in tunnels under the floor, part is on or slightly above the floor level and the remainder is situated in close proximity to the roof beams.

The molding section is divided into two main units served by power driven conveyors that terminate on one side of a wide gangway extending across the building in front of the battery of melting furnaces. A steel grating in the floor at the end of each conveyor catches the castings while the sand falls through upon a wide belt mounted on suitable rollers in a tunnel below the gangway. This transverse belt discharges the sand upon a second belt running at right angles to the first and located in a tunnel close to one of the side walls of the building. It is interesting to note that one belt carries all the sand back to the mixing station, while two belts, one for each mold-

FIG. 2—BIRDSEYE VIEW OF PART OF THE FLOOR SHOWING THE RELATIVE POSITION OF THE EIGHT OIL FIRED MELTING FURNACES AND THE SHAKEOUT GRATINGS AT THE ENDS OF THE CONVEYORS

Washer Tubs

Equipment for Reconditioning and Intensive Production Is Secured

By Pat Dwyer

Fig. 3—Castings are poured from two sides

ing unit, are required to distribute the sand after it has been prepared.

Sand is reconditioned for use in a style of equipment that has become fairly well standardized in recent years and which has been described in several past issues of THE FOUNDRY. The actual dimensions of the various belts, hoppers, conveyors and storage bins have varied in accordance with the amount of sand required for daily operation, but the underlying principle on which the system operates remains the same.

Owing to the comparatively low temperature at which the metal is poured, the thin section which does not unduly heat the sand and the rapidity with which the castings are dumped, the sand requires only a small amount of either new sand or water to render it once more fit for use. Also the heat of the sand is so slight that it is entirely dissipated before the sand has arrived at the molding station. The required amount of new sand together with sand from the overflow chute and any sand collected in cleaning the gangways, is shoveled through any one of a number of gratings in the floor above the main feed belt which carries the sand to the sand mixing station located in one corner of the building. One man attends to all the sand mixing equipment through a series of switches mounted on an electric control panel located in the immediate vicinity of the installation. Conveyors for the molds and empty flasks also are controlled from this same station. Each unit in the system is under separate control and may be operated or stopped independently of the others. This insures extreme flexibility and provides for practically uninterrupted production on the floor. The storage bins and feed hoppers are of sufficient capacity to supply the molding machines with sand for a reasonable period in the event of an unexpected tie-up in the main sand supply line.

Sand on the return journey from the shakeout stations falls from the end of the main conveyor belt into the boot of a bucket elevator which carries it aloft and discharges it through a revolving screen into steel storage hopper with a capacity of 50 tons. The sand feeds steadily through an opening in the bottom of the hopper to a steel flight conveyor which serves a second elevator. This elevator carries the sand aloft a second time and discharges it into a revivifying device provided by the Link-Belt Co., Chicago.

The sand falls on a rapidly revolving wheel which throws it with considerable force and speed through a labyrinth of 1-inch steel rods suspended in staggered formation from the cover of the device. The general effect is to disintegrate the sand and break it up into a fluffy mass that falls on to a feed belt below. Water is sprayed on the sand just

FIG. 4—A CHAIN HOIST SUSPENDED FROM A MONORAIL IS EMPLOYED TO LIFT THE MOLD FROM THE CONVEYOR TO THE SHAKEOUT GRATING AND LATER TO RETURN THE COPE TO THE RETURN CONVEYOR. THE CASTING AND THE DRAG ARE LIFTED BY HAND

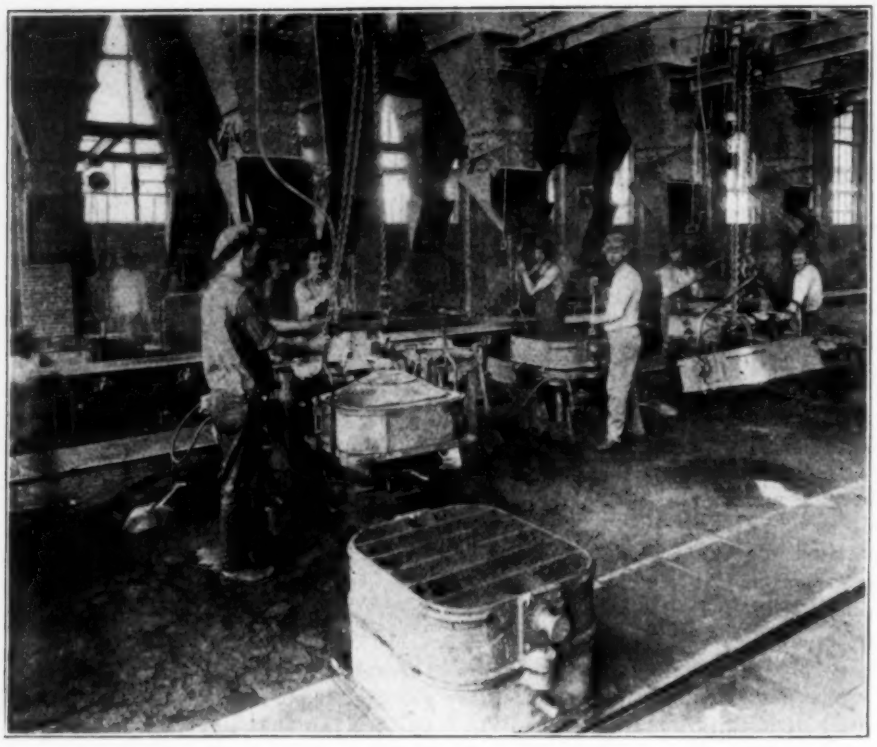


FIG. 5—A SPECIAL LIFTING DEVICE IS EMPLOYED TO CONVEY THE DRAG MOLD FROM THE ROLLOVER MACHINE TO THE MOVING CONVEYOR

before it enters the revivifier. The amount is fairly constant, but is regulated as occasion may arise by an attendant. A cam on the wheel shaft with every revolution raises the cover with the suspended rods and then allows it to fall back with a jolt. This simple device corresponds to the molder's rat-tat-tat on the rim of his riddle and effectually prevents the sand from accumulating on the rods or on the sides and ends of the hood.

Hopper Over Each Machine

Arrangement of the feed hoppers over the molding machines may be noted in Fig. 6. They are supplied with sand from an endless belt located and running horizontally directly over the center of the battery. Plows adjusted at suitable angles deflect the moving stream of sand into the various hoppers.

Position of a second battery of machines and hoppers may be noted in the background of the same illustration. They are supplied with sand from a second feed belt similar to the first. Both belts receive the sand from hoppers that are fed by a belt which passes under the revivifier and catches the sand as it falls fresh and cool from the suspended rods. Under ordinary conditions a plow is adjusted to deliver an equal amount to each molding section, but if necessary the entire supply may be diverted to either one.

If, at any time the sand is supplied in excess of consumption it is carried on the feed belt over each battery of machines to a cross belt leading to a chute that discharges the sand through a grating in the floor above the main supply belt.

Molds are made on two mechanically equipped units that occupy the greater part of one-half the building. A battery of eight, oil-fired, tilting furnaces made by the Monarch Engineering & Manufacturing Co., Baltimore, extends across the floor near the center of the building. The remainder of the floor space is utilized temporarily as an assembling floor on which to make up the aluminum charges for the furnaces. Eventually a mezzanine floor will be erected over this part of the floor. The metal will be stored on this floor and charged directly into the upturned openings in the furnaces. Additional molding equipment will be placed on the ground floor to meet the contemplated schedule of 1000 sets of washing machine castings per day. The output at present is between 550 and 600.

Continuous Molding

One of the two molding stations with its conveyors, sand hoppers, molding machines and general size and type of flasks employed, is shown in Fig. 6. The molding machines made by the Johnson & Jennings Co., Cleveland, are arranged in two rows 10 feet apart. This battery is engaged in the production of miscellaneous small parts and is served by three steel flight conveyors. The conveyors on the outside carry the molds toward the shakeout stations while the empty flasks are returned to both units of the battery of molding machines by the conveyor in the center. Each conveyor is equipped with an individual motor and may be operated independently of the other two.

Among the advantages claimed for the installation, advantages reflected in the output, are that the molding machines are operated to their full capacity. All the operator has to do is place the flask on the machine, lift it off and place it on the conveyor. All the usual time consuming features connected with making small molds on a bench are eliminated.

The flasks are piled close to his hand. By simply pulling on a handle over his head the flask is filled with sand. Slight pressure from a knee

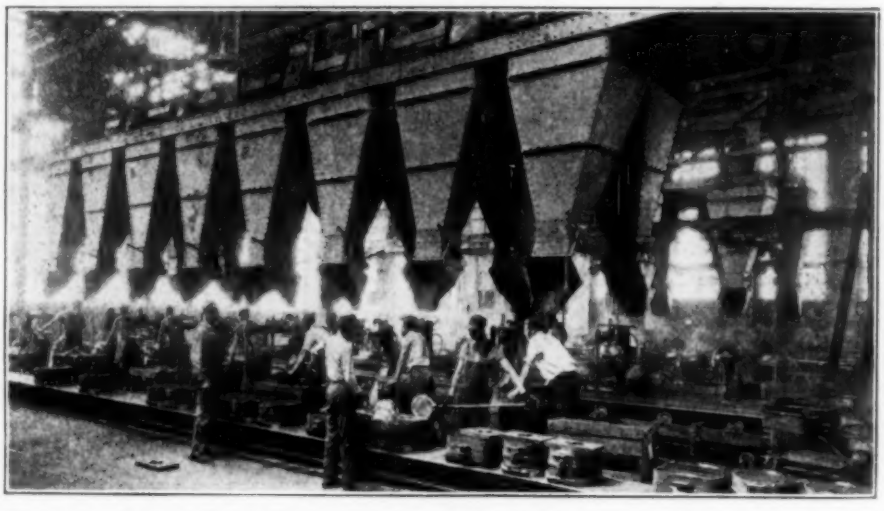


FIG. 6—MISCELLANEOUS SMALL CASTINGS ARE MADE ON A BATTERY OF 16 MACHINES EACH ONE FED FROM AN INDIVIDUAL SAND HOPPER

valve admits compressed air to a cylinder and the sand in the flask is rammed in a few seconds. The pattern is drawn mechanically in a more perfect and accurate manner than it possibly could be drawn by hand. Instead of carrying the mold a considerable distance and then lowering it to the floor, the operator lifts it from the machine, walks not more than three steps and places it on a conveyor traveling at slow speed at a convenient height above the floor. There his duties in connection with the production of the casting ceases. A single attendant to each conveyor shifts the weights from the poured molds to the other molds as they enter the pouring zone. Two men with hand ladles pour metal continuously. They get it directly from the furnace and in that manner the temperature is maintained more uniformly than if the heat first was poured into a large ladle and then distributed by hand ladles.

FIG. 8—SMALL MOLDS SLIDE AUTOMATICALLY FROM THE CONVEYOR TO THE SHAKEOUT GRATING

High And Low Conveyors

At the point shown in Fig. 8 where the conveyor goes over the sprocket for the return journey under the floor, each flask is engaged in turn by two thin steel strips which take it from the conveyor plate and slide it down an incline to a steel grating in the floor. Here two men remove the casting and place the empty flask and board on the central conveyor which takes it back to the molding station. The casting is lifted with a hook or dragged along the floor a short distance and dropped through a chute into a tunnel where a conveyor takes it to the cleaning room.

The second molding unit, glimpses of which are shown in Figs. 1 and 3 differs in several respects from the first. The general features, common automatic sand supply, division of work among several men, conveyors for full and empty flasks and method of pouring the molds are the same. Variation in detail principally is owing to the fact that the flasks used in this second unit are larger than the flasks employed in the first.

Two classes of castings are made in this unit, the tub casting proper which requires a comparatively deep flask with a 10-inch drag and a 10-inch cope as shown in Fig. 1 and the top casting for the tub which is made in a shallow flask. On account of the difference in height between the flasks a separate conveyor system has been installed in connection with each battery of molding machines.

The tub castings are molded on three pairs of jolt machines made by the Davenport Machine & Foundry Co., Davenport, Iowa. The drags are rolled over but the copes are lifted directly from the machine and placed on the waiting drags. Each pair of machines turns out over 200 tub molds per day. The molds are assembled on a conveyor that travels only a few inches above the floor level. By referring to Fig. 3 it may be noted that this arrangement brings the top of the cope to the most convenient height for the men who pour the metal.

No Clamps Used

Reference to the same figure also will indicate the extent to which short cut methods have been adopted to increase production over any given period. The cope neither is clamped to the drag nor weighted. Experiment in early days proved that the weight of the cope was sufficient to resist the lifting pressure of the molten metal. The casting is poured simultaneously from two sides and a small riser cut in the sand in the ring at the highest point serves to show when the mold is full.

Castings for the tops are molded on a battery of eight, jolt machines made by the Johnson & Jennings Co., Cleveland. This battery is served by a high conveyor system on which the shallow flasks travel at a convenient height for pouring. The molding machines are located between one conveyor which takes the molds toward the shakeout station and a second conveyor employed for bringing the empty flasks back to the molding station.

All the conveyors have a uniform length of 90 feet and extend from near the wall of the building at one

(*Concluded on Page* 563)

FIG. 7—SCRAP ALUMINUM IS BROUGHT IN WHEELBARROWS FROM A STOCK PILE IN THE YARD

Refining Metals Electrically

Chapter VII (Continued)

Basic Practice on White Iron —Duplexing Proves To Be Unsatisfactory

THE first result of using the basic furnace for making white iron castings was the reduction of defective castings to almost nothing, with the practical elimination of customers complaints. As operations advanced the main features of basic melting were found to be:

Elimination of all former trouble due to analysis and control of the iron itself. The carbon and manganese could be held to narrow limits, while no trouble was experienced in keeping the silicons down on either heats from steel, or those in which a large proportion of the charge was returned shop metal.

Accurate regulation in temperatures was attained. It was possible to hold the metal indefinitely with no great changes, while the chemical composition was brought to the desired point. This feature was of great importance as often a heat would have to be held waiting on the molders for a rush, or breakdown job, where in the acid furnace silicon trouble always developed.

Extremely low sulphurs and complete deoxidation were obtained. The first result noticeable, and traced to this feature was the elimination of cracking or the display of tenderness in the molds. The second was a metal more free from inclusions or segregated spots, where patches of unequal hardness previously had been obtained.

No trouble was experienced in any manner with the wall or hearth refractories.

Slag control was more satisfactory, practically every heat pouring from a heavy carbide slag, due to the large amount of reducing material present in the bath.

The difference in time, power consumption, and cost were nearly equal for the two processes, and when the saving in lost castings was considered, was in favor of basic operation, as will be noted from the following:

Time per ton Hours	Kw. Hr. per ton	Conversion per ton
1.46	705	$12.30
1.29	730	$13.60

Due to having more difficulty in clearing the basic slag from the ladles, during pouring on the floor, it took approximately 32.4 minutes to pour a ton of basic metal into the molds, as against 26.5 minutes for the acid iron. Later, use of tea spout ladles cut down this disadvantage greatly, and bottom pour ladles would have resulted in equal figures.

While the figures on operations are those actually obtained, they would be of no use to any other shop as a criterion of white iron operations, as the furnace used in these tests was an old fashioned make, not well adapted to the operations. The shop itself was poorly laid out, resulting in a great loss of time. Later figures of approximately 525 kilowatt hours per ton of iron have been obtained with more modern equipment. This is probably nearer the true figure required to melt this product.

Meeting the Unusual

BASIC furnace practice on white irons presents many interesting and unusual features. While more regular results are obtained with this type of lining than with the acid furnace, the mixture of the charge exerts a marked effect in the former as well as with the latter. Resistance to shock is a desirable factor in ball mill parts. In making white iron for this service, the author found that silicon played an important role. In fact, so marked was the effect of this element that it was found difficult to handle the gates and sprue and other remelt without a careful check of analysis. Ideal mixtures are suggested for making this type of castings. These were determined after exhaustive tests. A characteristic of good white iron for grinding balls is a crystalline, radiating fracture.

Basic Furnace Practice

BEFORE charging the scrap on a basic heat, the hearth is covered carefully with the slag mixture calculated to 2 per cent of the charge by weight. This mixture is made by grinding lime, fluorspar and anthracite coal in a muller, in the proportion of 75 per cent lime, 15 per cent spar, and 10 per cent coal. The recarburizer then is added being calculated to 3.00 per cent carbon, attention being given to the recovery of carbon from the different materials. This ranges from about 80 per cent for graphite flakes down to 50 per cent for the average grade of foundry coke. The selection of the recarburizer follows those precepts as described under the chapter on synthetic irons.

The charge now is added, any good grade of steel scrap offering an excellent material, if fairly clean. Bundled tin-can scrap has been tried on account of its cheapness, but does not offer a metal of first grade qualities. As a metal of the lowest possible phosphorus, consistent with economic considerations, is desired, wrought iron does not prove as suitable as does steel of lower phosphorus percentages. The doors now are sealed tightly, being luted with clay, if this proves to be necessary, and the current is

REDUCTION IN AREA OF 0.505-INCH BARS

Computing the reduction of area in the standard bar adopted for testing cast steel involves a mathematical procedure which may be avoided by the use of the tables which follow. Using as a basis the diameter of the bar after stressing, the area has been figured and the percentage reduction in area has been found. In each case, the diameter given in the left hand column is that measured from the test bar after pulling. The adjoining column gives the area of the reduced section and the right hand column is the per cent reduction of area, compared with the standard area of a 0.505-inch bar.

REDUCTION IN AREA OF 0.505-INCH BARS

Diameter	Area	Per Cent Reduction in Area	Diameter	Area	Per Cent Reduction in Area
0.250	0.0491	75.49	**0.272**	0.0581	70.99
0.251	0.0495	75.29	**0.273**	0.0585	70.79
0.252	0.0499	75.09	**0.274**	0.0590	70.54
0.253	0.0503	74.89	**0.275**	0.0594	70.34
0.254	0.0507	74.69	**0.276**	0.0598	70.14
0.255	0.0511	74.49	**0.277**	0.0603	69.90
0.256	0.0515	74.29	**0.278**	0.0607	69.70
0.257	0.0519	74.09	**0.279**	0.0611	69.50
0.258	0.0523	73.89	**0.280**	0.0616	69.25
0.259	0.0527	73.69	**0.281**	0.0620	69.05
0.260	0.0531	73.49	**0.282**	0.0625	68.80
0.261	0.0535	73.29	**0.283**	0.0629	68.60
0.262	0.0539	73.09	**0.284**	0.0633	68.40
0.263	0.0543	72.89	**0.285**	0.0638	68.15
0.264	0.0547	72.69	**0.286**	0.0642	67.95
0.265	0.0552	72.44	**0.287**	0.0647	67.70
0.266	0.0556	72.24	**0.288**	0.0651	67.50
0.267	0.0560	72.04	**0.289**	0.0656	67.25
0.268	0.0564	71.84	**0.290**	0.0661	67.00
0.269	0.0568	71.64	**0.291**	0.0665	66.80
0.270	0.0573	71.39	**0.292**	0.0670	66.55
0.271	0.0577	71.19	**0.293**	0.0674	66.35

(Continued on Data Sheet No. 582)

REDUCTION IN AREA OF 0.505-INCH BARS

(Continued from Data Sheet No. 581)

Diameter	Area	Per Cent Reduction in Area	Diameter	Area	Per Cent Reduction in Area
0.294	0.0679	66.10	**0.333**	0.0871	56.52
0.295	0.0683	65.90	**0.334**	0.0876	56.27
0.296	0.0688	65.65	**0.335**	0.0881	56.02
0.297	0.0693	65.40	**0.336**	0.0887	55.72
0.298	0.0697	65.20	**0.337**	0.0892	55.47
0.299	0.0702	64.95	**0.338**	0.0897	55.22
0.300	0.0707	64.70	**0.339**	0.0903	54.92
0.301	0.0712	64.45	**0.340**	0.0908	54.67
0.302	0.0716	64.25	**0.341**	0.0913	54.42
0.303	0.0721	64.00	**0.342**	0.0919	54.12
0.304	0.0726	63.75	**0.343**	0.0924	53.87
0.305	0.0731	63.50	**0.344**	0.0929	53.62
0.306	0.0735	63.31	**0.345**	0.0935	53.32
0.307	0.0740	63.06	**0.346**	0.0940	53.07
0.308	0.0745	62.81	**0.347**	0.0946	52.77
0.309	0.0750	62.56	**0.348**	0.0951	52.52
0.310	0.0755	62.31	**0.349**	0.0957	52.22
0.311	0.0760	62.06	**0.350**	0.0962	51.97
0.312	0.0765	61.81	**0.351**	0.0968	51.67
0.313	0.0769	61.61	**0.352**	0.0973	51.42
0.314	0.0774	61.36	**0.353**	0.0979	51.12
0.315	0.0779	61.11	**0.354**	0.0984	50.87
0.316	0.0784	60.86	**0.355**	0.0990	50.57
0.317	0.0789	60.61	**0.356**	0.0995	50.32
0.318	0.0794	60.36	**0.357**	0.1001	50.02
0.319	0.0799	60.11	**0.358**	0.1007	49.73
0.320	0.0804	59.86	**0.359**	0.1012	49.48
0.321	0.0809	59.61	**0.360**	0.1018	49.18
0.322	0.0814	59.36	**0.361**	0.1024	48.88
0.323	0.0819	59.11	**0.362**	0.1029	48.63
0.324	0.0824	58.86	**0.363**	0.1035	48.33
0.325	0.0830	58.56	**0.364**	0.1041	48.03
0.326	0.0835	58.31	**0.365**	0.1046	47.78
0.327	0.0840	58.06	**0.366**	0.1052	47.48
0.328	0.0845	57.81	**0.367**	0.1058	47.18
0.329	0.0850	57.56	**0.368**	0.1064	46.88
0.330	0.0855	57.31	**0.369**	0.1069	46.63
0.331	0.0860	57.06	**0.370**	0.1075	46.33
0.332	0.0866	56.76	**0.371**	0.1081	46.03

(Concluded on Data Sheet No. 583)

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

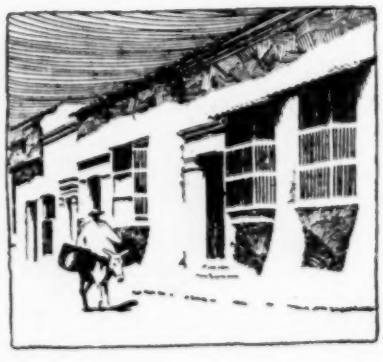
THE FOUNDRY DATA SHEET, JULY 15, 1925

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Around the World with The Foundry

Little Journeys to the homes of our readers

Colombia



MINED and reduced under the most primitive conditions and packed down the steep sides of the Cordilleras on jingling mule trains, gold to the value of $300,000,000 flowed in a steady stream across the broad Atlantic for the three centuries that Colombia served as the Eldorado of the West and the treasury of the royal house of Spain. The galleons and plate ships that plied the Spanish Main during the sixteenth, seventeenth and eighteenth centuries represented the bread thrown upon the waters by Queen Isabella when she pawned the crown jewels to finance Columbus on his memorable quest for a short trade route to the Indies.

Situated on the northwestern corner of the South American continent with the Caribbean Sea on the north and the Pacific on the west, with the Cordilleras spread out like the three fingers of a giant fan in the center, the climate ranges from tropical along the coast and the lowlands to mild and temperate on the plateaus between the mountain ranges.

The commerce of Colombia like its industries has been hindered by lack of transportation facilities, the frequency of political disturbances and the heavy import and export duties. The manufacture of castings is carried on to a limited extent in the vicinity of Bogota and to one of the few foundries in the district The Foundry with its wealth of practical and theoretical technical information is delivered twice a month.

"Wherever metals are cast you'll find THE FOUNDRY"

turned on. During melting the furnace may be kept heavily reducing by the addition, at slight intervals, of a small amount of coke if required. The condition within the furnace can be followed closely by the appearance of the flame, a sharp flame denoting oxidizing conditions, while the soft, brightly luminous flame denotes proper reduction.

As soon as melted, the bath is treated in exactly the same manner as if synthetic iron was being made, the carbon being raised by boiling with green wood poles, or by rabbling. However, when the percentage of carbon is correct, slightly different procedure is followed. Instead of adding the ferrosilicon at once, the slag is brought to a finishing condition by additions either of lime, if thin, or spar if thick. As soon as the metal is under a heavy carbide slag, and one which thoroughly covers the bath, the doors again are sealed and the heat allowed to run for a sufficient length of time to bring the metal to a fairly high temperature. The silicon now may be added and the doors again closed. In about five minutes a metal test can be taken in a sand mold, and as soon as thoroughly set it may be water quenched and broken for fracture appearance. At the same time this quench test is poured another in a sand mold should be cast and allowed to cool to a black, before being broken. This latter is for the hardness, and a heat never should be poured until the required hardness of the metal is attained.

The proper appearance of such a fractured, slow cooled, test piece should be a dead white, tending toward gray. The crystalline structure should be well defined, the crystals radiating from the center of the test piece. If the crystals are small, the carbon is not high enough and the bath must be boiled further under a blanket of carbonaceous material. If the least trace of a mottled appearance shows, the silicon is too high, and the steel scrap must be added until the fracture shows the hard, white color. If care is exercised in adding the ferrosilicon this mottled iron should be found rarely.

The castings poured from this iron was hard, but seemed to lack something in strength and resistance to shock. In certain practical tests made, the iron was not as good as it should have been. With the idea in mind of improving the physical qualities of the metal the use of alloys such as nickel and chromium was made, and the effect noted.

Alloyed White Irons

THE first alloy used in making alloyed white iron was nickel, heats being made with percentages ranging from 0.50 to 3.00 per cent nickel. It was found that nickel alloyed with the iron in all proportions, and offered nothing new in the melting methods. Certain pecularities cropped out in the finished castings. It was found that the nickel seemed to retard the action of silicon in throwing carbon out of solution, and all the heats of an equal silicon content gave a much higher combined carbon content when nickel was used in the mix. At the same time, the iron appeared to be softer, and cases were found where the fractures of castings were a true white, yet the iron could be machined. As we desired a hard iron, nickel alone was discontinued and a combination of nickel with chrome was used. The same results still held and certain experiments were made to determine to what extent this retarding of the silicon would hold. It was found that irons with a silicon content as high as 1.75 per cent, and in several instances as high as 2.00 per cent would show a white fracture, yet would be machinable. One heat in particular, with an analysis of carbon, 3.22 per cent; nickel, 0.64 per cent; chromium, 0.44 per cent; and silicon 2.32 per cent gave a white fracture, and it was tried in a drill press. It drilled quite easy and the drillings seemed similar to those from a hard piece of steel in that there was a great tendency for the chips to curl from around the tool.

From the results it was found that nickel had a tendency to soften the iron regardless of the percentage present, 0.50 per cent seeming to give as soft an iron as when 3.00 per cent was used. This point seemed to follow regardless of the silicon content, until at percentages of the latter below 0.80 per cent the iron again turned hard. Therefore, nickel gave no added characteristics which would make its use overcome the added cost of manufacture and its use was entirely abandoned.

Mayari pig iron, containing nickel and chromium, in a natural alloy was tried. The results were slightly different from those obtained with the pig nickel in that the softness obtained was not nearly so great, although there was an apparent softness to the metal after casting.

The next alloy used was manganese. This was used in many varying proportions. In high percentages such as 2.00 to 3.00 per cent, it had a tendency to close the grain of the iron, but seemed to possess no favorable points.

Chromium, up to this time, had not been used alone, and several heats were made using this alloy. Soon, it was noticed that the iron possessed new features. The fractures changed from a dead white to a lusterless color between a white and a faint gray, yet the iron could not be touched with a tool. The gates on the castings were not so easy to break as they had been with the other mixtures, and it was apparent that this alloy, when used alone, offered certain points which might be of importance, so that the trend of experimentation changed from the use of various alloys to that of determining the percentage of chromium which would best suit our needs.

Table LX

Tests of Electric Furnace Iron

	Per Cent					
to crush	Total carbon	Manganese	Silicon	Chromium	Brinnell number	Mark
3	3.70	0.57	4.39	4.48	422	A
9	3.04	0.51	0.65	0.46	438	B
9	3.54	1.25	1.41	1.43	417	C
11	2.45	0.32	0.47	0.23	430	D
17	3.00	1.05	1.41	1.08	408	E
20	2.70	1.13	1.73	0.83	393	F
23	2.56	0.72	1.39	0.78	402	G
35	2.34	0.70	1.26	0.64	409	H
56	2.30	0.70	1.88	0.53	398	I
58	3.53	0.86	0.80	0.75	411	J

The chemical and physical testing facilities of the plant being rather poor, it was difficult to determine what procedure to follow in determining the resistance to shock. Finally, it was decided to cast balls of 3-inch diameter from every heat, and determine the comparative number of blows necessary to fracture them. The method used was to hold the ball firmly on an anvil, and strike it with a 16-pound sledge until rupture occurred, the number of blows necessary to break the ball being taken as an indication of its toughness and resistance to shock. Only one man was allowed to do the striking, and every test was made under parallel condi-

tions as far as possible. While this test did not give any exact data, it did show which analysis of metal would stand the greatest shock before failing. This test was as close as possible to the exact conditions in a ball mill and as later results showed was a good indication of the amount of abuse the metal would stand in actual service. For testing the hardness of the various metals, a brinnel meter was used, the test being taken from one face of a 3-inch ball which had been ground perfectly smooth. We had no available method of testing for wearing resistance, so attempted to obtain a metal as hard as possible, and one which would stand the greatest amount of shock without breaking.

The results of these tests are given in table LX. A description of the treatment of the specimens follows.

The heat, from which specimen *A* was taken, was made in the cupola and duplexed, the alloys being added in the electric furnace, and the heat brought up to tapping temperature under a heavy carbide slag, being held in this finishing condition approximately 15 minutes. Several heats were treated in this manner, but always with the low result, showing brittle iron, which seemed to prove the point that if it was poor as it came from the cupola, it required a great deal more than this small amount of alloying, refining, and superheating to bring into a first class metal. The cupola charges consisted almost entirely of steel, only enough cast scrap being added to give fluidity, the iron often being almost pasty when added to the electric furnace.

Heats *B* and *C* were taken from the cupola and held in the electric furnace under a carbide slag for one hour each. While the results were better they showed conclusively that there was yet something which remained in the iron, due to the cupola melting, which mitigated against its toughness. The theory was advanced that oxide had actually dissolved in the iron during its travel through the cupola, and was in such a state of solution that the reducing action of the basic slag and superheating were not sufficient to free it from its combination, unless by such a long and tedious process as would prove too costly for its treatment. The theories on this oxide inclusions were strengthened greatly as every heat poured under the conditions mentioned cracked badly in the molds, often showing a line of gas holes along the break, giving rise to the thought that the pressure of solidification was so great that the gas was expelled and in so doing its force caused the still tender casting to rupture along the path of release.

To determine if this oxide or unknown constituent could be eliminated we made a duplexed heat in which the metal was held in a superheated condition under a perfect carbide slag, with the doors tightly sealed, for two hours. The results, specimen *D*, are practically identical with those held for only a short time, and proved that this long refining was but a loss of time and money.

Different classes of steel scrap melted down with no apparent attempt to greatly raise the carbon other than that initially charged gave specimens *F*, *G* and *H*. The lime slag was added after the melt down, the metal being held under this carbide condition until superheated to the desired temperature. These heats were used to note if a change in the class of scrap caused any difference, the charges consisting of borings for one heat, first quality boiler plate and punchings for another, and clippings mixed with borings for the third. The results showed that the class of scrap made little difference if clean, and of a medium high grade nature.

Two type heats were made of the same charges, *I* and *J*, the best clean punchings obtainable being used, the heats melted from the start under a carbide slag, the test being to determine whether a low silicon with high carbon, or a low carbon with high silicon gave the best results. This series of tests, when analyzed carefully showed several interesting points. Duplexing was not satisfactory, not only because of the cost of this method, but the desired quality could not be obtained. The worst fault was the defectives caused by oxides, consisting of such items as draws, blowholes, cracked work, and iron of a brittle nature. The fractures of a failed casting from one of these heats showed a weak appearing structure, containing rather small sized crystals, with poor cohesion. This seemed to follow regardless of the final analysis of the metal.

Further, it was found when the total carbon in the iron was low it required a much larger amount of silicon to give equal results to an iron with a higher carbon content. These low carbon irons also exhibited a peculiarity in that irons with as high a silicon content as 1.50 per cent still would show a clear white fracture, with a comparable hardness to those standard white iron with an average carbon and low silicon.

Regardless of the exact chemical composition of the iron the most exacting care was necessary if proper qualities were to be obtained from the casting made of duplexed metal. This covered particularly the melting and refining and clearly showed that the best grade of scrap steel must be used; that melting down conditions must be carefully checked and the formation of any oxides prohibited; and that the refining period required the same care as if a heat of special steel were being made.

These trials further showed that there were two general types of analysis, each of which gave comparable tests, and could be taken as representing the best metal, when viewed from the standpoint of toughness, and hardness number. These were as shown in Table LXI.

TABLE LXI

Suggest Mixtures for White Iron

	Per Cent			
	Carbon	Manganese	Silicon	Chromium
Type X	3.00 to 3.50	0.70 to 0.90	0.70 to 0.90	0.60 to 0.80
Type Y	Under 3.00	0.50 to 0.70	Over 1.00	0.40 to 0.60

These two types were segregated after analyzing the results from a large number of heats. After these were selected, many more heats of these two classes were made to determine if the choice had been warranted, and to determine, if possible which of the two was the better.

It was found that each class could be made easily and regularly and that the results were uniform, and amply proved the correctness of the first selection. Each type showed a clear white fracture on breaking, when cast into a 3-inch ball the latter type giving a white fracture with a silicon of nearly 1.50 per cent when the carbons were low. All fractures had a soft, dead appearance, and were close grained and tightly knit, the crystalline structure radiating clearly from the center of the ball. This radiating fracture finally was accepted as the best test of the irons toughness, a casting with such a fracture always would stand a high test, while one without this class of break usually would be more brittle.

However, the crucial test was the

manner in which the two types would stand up in actual service, and for this test castings of the two different analyses were made and placed in operation, being run against each other as far as possible. Tests were made to cover all the desired points as toughness, hardness, and wearing ability. It was found that the shop tests had been a good measure of the toughness, and hardness, but that when the castings were subjected to the rigors of abrasive duty, type *X* was far superior. While there was no appreciable difference in the two irons as far as color went, it seemed that the silicon in higher amounts so changed the structure that a softening ensued, although analyses for combined carbon on the two types showed a close agreement.

With the analysis selected it was considered that it would be easy to obtain regular results with this iron. Operating the furnace with a charge of steel scrap, and under the standard series of operations as if making a synthetic iron, excellent results were obtained. The metal was always of a good, clean character, and high tests predominated. However, as soon as remelted shop scrap was used in the charge, trouble ensued. Here was a proposition different from that of building up the metal from raw steel.

In the first place, the alloys already are contained in the metal in the proper proportions, and in the second place it proved difficult to estimate the losses of the various constituents during the melting down period, this factor depending upon the size of the individual pieces, their condition of oxidation, the rate of melting, the amount and condition of the slags, etc. Slight variations in the carbon, chromium and manganese were found to have little effect, but changes in the silicon content caused trouble. If too low, the metal was weak, and if too high the iron would be soft. As it was extremely difficult to operate for silicon under close chemical control, due to the length of time necessary for the chemist to make an analysis for this element, we were forced to estimate on the percentages of this alloy present. To assist as much as possible, the heads and gates from each heat were separated and held until an analysis had been made. Each pile being thus closely known it became matter to control the analysis closely. After checking a few heats, the losses of the different elements were determined. It was found that the average losses were as follows: Manganse, 0.10 per cent; silicon, 0.20 per cent; chromium, 0.20 per cent and carbon, 0.05 per cent.

Many trials showed that these losses were close, and were exact enough so that if estimated on this basis, the heat would prove within specifications. These figures were for heats containing 100 per cent of shop scrap, of a medium size, and in a clean condition.

The analysis being controlled, it still was found that results from shop scrap were not good. Many heats were poured of practically exact compositions yet one would be excellent, while another would be extremely brittle. Close checking showed that on the heats which were good the fractures of the gates had the radiating structure while brittle heats showed the soft, feathery, structure without distinct crystalline outline.

With this idea in mind, several heats were poured and the test fractures closely noted before tapping. It always proved true that on the heats where the furnace test bar showed a radial structure, the castings were of extremely high character, while on those fractures showing a feathery grain the exact opposite held. The problem then presented was always to obtain this structure before tapping and the trend of experimentation turned to the solution of this trouble.

Cast Aluminum Washer Tubs

(*Concluded from Page* 559)

end to the shakeout gratings previously referred to near the center of the building. The large flasks from the second molding unit are lifted from the conveyor by a small chain hoist suspended from an oval monorail. In practice the entire flask with its casting and sand content is lifted from the conveyor and placed on the grating. The cope then is lifted by the crane, the sand is shaken out and the cope is placed on the return conveyor. One of the attendants lifts the drag and getting inside carries it by hand to the return conveyor as shown in Fig 4 Two men then remove the casting and dump the sand from the bottom board.

The flasks are made of cast iron and are machined accurately to insure a close fit. They conform to the shape of the casting including the rounded corners. The metal section is only ½ inch and therefore the flasks easily are handled by hand when empty. The molds are lifted from the machines to the conveyor by chain hoists suspended from short monorail sections, one leading from above each machine to a point above the conveyor.

Aluminum for the castings is melted in eight oil fired furnaces. Each furnace has a rated melting capacity of 800 pounds and a fuel consumption of approximately 1 gallon of oil to 60 pounds of metal. The charges are made up of virgin metal and scrap in varying proportions depending on the general characteristics of the available scrap. Crankcases from scrapped automobiles form the great bulk of the scrap employed. These castings originally are made from good material and the metal is not subjected to any treatment in use that will cause it to deteriorate. Each charge is melted down and tapped out clean before the following charge is placed in the furnace.

Specializes in Castings

The old firm of Wm. T. Bate & Son, Inc., Conshohocken, Pa., established originally some 60 years ago, has abandoned the business of manufacturing boilers and now is specializing in the production of iron and steel castings. The company's old foundry is being devoted to the production of gray iron castings. It has equipped the old Hummel Steel Casting Co. foundry, which it bought in May, for the production of electric steel castings. The company now is doing a jobbing business in gray iron, semi-steel, steel and alloy castings. The company originally was known as Wm. T. Bate & Son. Two years ago the name was changed to Richard H. Bate Jr., this year it was incorporated under its original title. E Lewis Gibbs, formerly Gibbs Mfg. Co., Canton, O., is president. T. Holland Nelson, formerly in the production department of Henry Disston & Sons, Inc., Philadelphia, and now consultant to the United Alloy Steel Corp., Canton, and the Ludlum Steel Co., Watervliet, N. Y., is vice president. A. E. Maskrey, formerly of the Cyclops Steel Co., Titusville, Pa., is general superintendent. The company now is preparing to expand its output to include stainless steel castings. In addition to its foundries, the company operates a plumbing supply business.

Henry F. Russell formerly of Lumen Bearing Co. has been appointed sales manager of the Sumet Corp. and Cored Bar Corp., Buffalo. The Cored Bar Corp. manufactures a wide range of various sized cored and solid bars cast from bronze bearing metal.

How Good Is Your

THE FOUNDRY will pay $100.00 Cash in prizes, for the names of these men

Do you know these prominent men of the Foundry industry?

This illustration was made from a photograph taken in Toronto at the 1908 convention of the American Foundrymen's association. How many of the men do you recognize? Your recollection, your ability to remember faces and names is worth money to you. Note the conditions of the contest.

Rules of the Contest

1—Three cash prizes will be awarded. First Prize $50.00; Second Prize $30.00; Third Prize $20.00.

2—The first person sending in a complete and correct list of the names of the men in the photograph or the greatest number of correct names will receive first prize. The person who is first to send in the next greatest number of correct names will receive the second prize. The person first sending in the next highest number of correct names will receive the third prize.

3—Answers will be time stamped immediately on receipt in the office of The Foundry, or at the exhibit space of this publication at the Syracuse convention of the American Foundrymen's association to be held Oct. 5 to 9. The closing date of the contest is Oct. 9 at 5 p. m.

4—Any reader of The Foundry is eligible as a contestant, excepting only employes of the Penton Publishing Co. or the judges of awards.

5—The judges of the contest, who make the final decision are the three gentlemen shown seated at the left of the illustration, George H. Wadsworth, E. J. Woodison and S. T. Johnson.

Do you appear in this photograph? If your picture is shown in this group, we want to get better acquainted. Send in a recent photograph of yourself, with your business biography. Your subscription to The Foundry will be entered for one year without charge.

Memory for Faces?

Use This Page for Your Answers

To the Contest Editor,
THE FOUNDRY,
1213 W. 3rd St.,
Cleveland, Ohio

Identify the men shown in the photograph on the opposite page.

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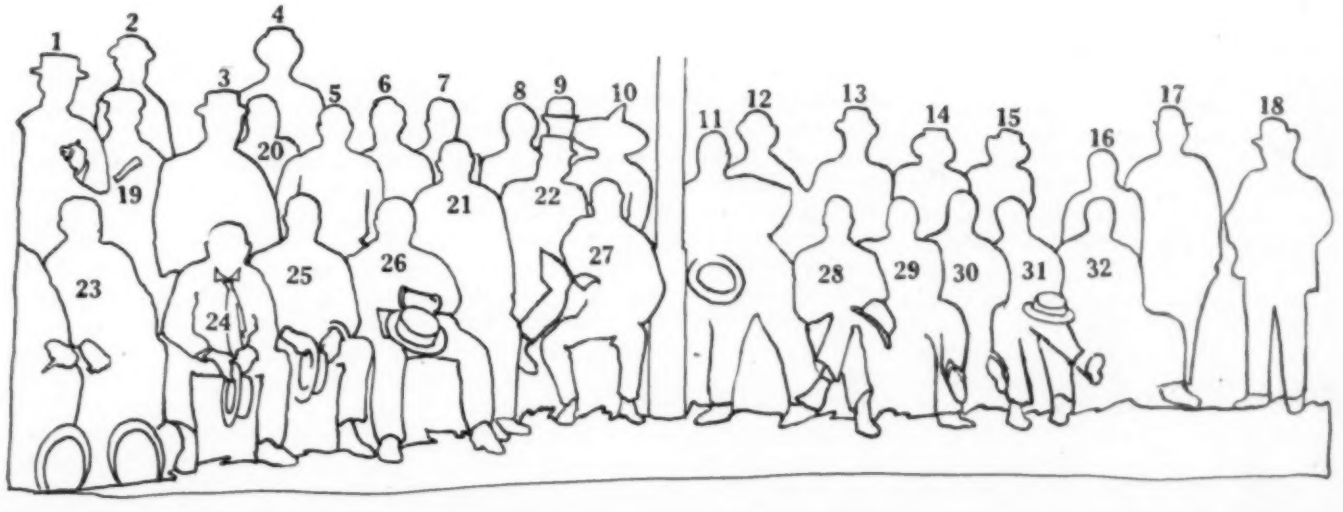


How and Why in Brass Founding

By Charles Vickers

Reducing Flame Used

We have experienced considerable difficulty in getting bushing castings to come sound. These castings consist of a straight pipe 10 inches in diameter, 24 inches long and ¾-inch in thickness, and they are cast on end in a mold made of dry sand and having a dry sand core. We have also tried them in green sand with exactly the same results. We are sending a sample from one of the castings. The alloy used consists of copper, 86 per cent; tin 9 per cent; zinc, 1 per cent. Some of the castings have been gated with pop gates on top, others at the bottom and still others midway of their length, but all came exactly the same.

An inspection of the broken piece of casting leads to the suspicion that the metal was melted with a flame rather strongly reducing in character. However, we are unable to go on record definitely with such a statement from merely examining a piece of the bronze. The enquirer may answer the question quickly, and if in the affirmative, a simple turning of the air valves may eliminate the difficulties. If we are mistaken in our surmise, and an oxidizing flame has been used, it will be advisable to use a deoxidizing alloy, such as phosphor copper. Add one-half of 1 per cent of the alloy containing 15 per cent of phosphorus, and if this fails to entirely eliminate the present condition, increase this amount to 1 per cent.

Use Phosphor Copper

We would like to know what success we may expect in using 15 per cent phosphor copper in making phosphor bronze? Heretofore we have used what we suppose would be called commercial phosphorus and find this quite satisfactory, but do not like the dangerous fumes which it seems are unavoidable when using this material. Would we have this same trouble when using phosphor copper. Also what percentage of phosphor copper should we use when making a high grade phosphor bronze? We would be glad to have you state what percentage of copper, tin and phosphor copper are used to make such an alloy.

The phosphorus used in this case is known as yellow phosphorus and is a dangerous substance to have in a foundry. Unless it is kept under water it will take fire in a few minutes, sometimes the vessel springs a leak, or the water evaporates, and serious accidents have occurred. The fumes are unpleasant, and harmful when breathed into the lungs, as they form phosphoric acid in contact with water. The phosphor copper now is used and has displaced yellow phosphorus. Phosphor copper does not fume, in fact it is added to the mixture like a piece of tin, or lead.

Any percentage of phosphor copper may be used to make a phosphor bronze, sometimes 2 ounces are added to 100 pounds of metal, and sometimes as much as 6 per cent and more. Some phosphor bronzes are used where strength is demanded. Such an alloy is 90 per cent copper 10 per cent tin. In this case 0.25 per cent phosphor copper will make a stronger alloy than 1.00 per cent, and 0.5 per cent of manganese copper will be better still. A nice, clean bearing alloy is one having 30 per cent lead, 5 per cent tin, 1 per cent phosphor copper, and 64 per cent copper, but not everyone can make it. A phosphor bronze much used for gears is copper 87 per cent, tin 11 per cent and phosphor copper 2 per cent.

Makes Pattern Alloy

We want to know how to make a pattern alloy having little shrinkage and which may be soldered. We think that what we want is known as a white metal.

The following alloy will meet the requirements mentioned: Zinc, 50 per cent, tin 50 per cent. Melt the zinc, then add to each 50 pounds a piece of common sheet aluminum about 2 inches square, such as cut from a kitchen utensil. Have the zinc hot enough so the aluminum will dissolve therein, then remove the zinc from the furnace and add the tin. If a harder alloy is preferred, add from 1 per cent upwards of antimony.

It is advisable to make up about 100 pounds at a time and ingot the alloy, putting the aluminum in on the first melt. The alloy may be remelted in an iron ladle in any amount required.

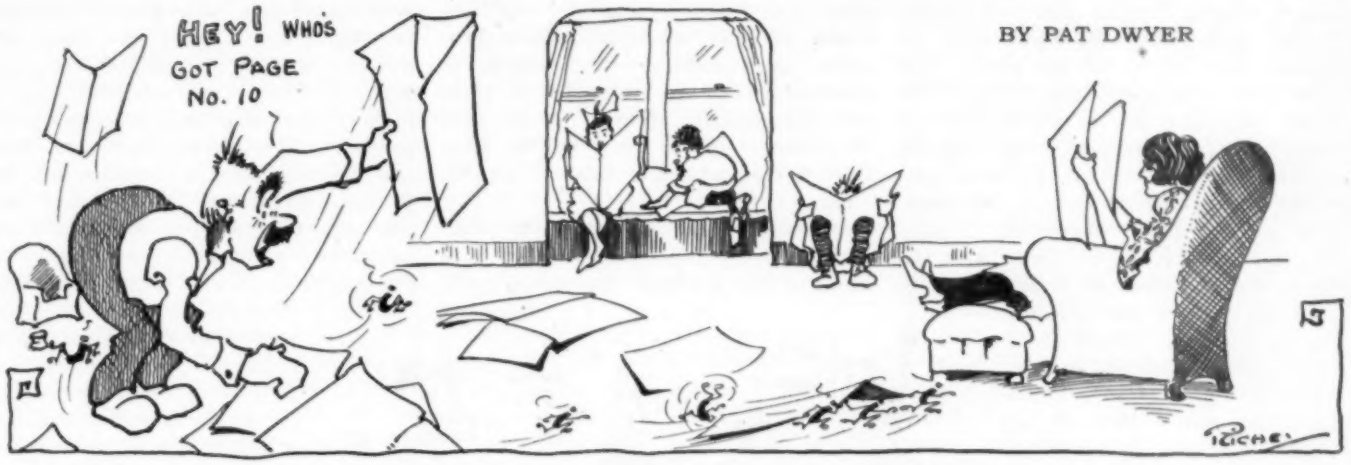
Gates Are at Fault

We are sending you a rough drawing of our method of gating an aluminum alloy casting for a washing machine lid, and also a piece of metal cut from the casting to illustrate the trouble we are having, which you will note consists of pit holes appearing in the areas marked on the drawing. We pour the molds on an angle with the sprue and gate 4 inches higher than the opposite end of the mold. We have experimented with scrap metal and virgin metal; the No. 12 alloy, pouring from 1100 to 1400 degrees Fahr., all with exactly the same results. The castings appear perfect when taken from the sand, and the holes which are confined to the cope surface, appear when the castings are buffed with a wire brush. We are casting a ring which mates with the lid. This ring is of the same thickness metal, but the width varies from 1 to 4 inches. Pit holes never appear in this casting.

Apparently the disk is about 18 inches in diameter and it has one flat side on which the two gates are located. These are about 5 inches broad, and practically form one continuous gate, flat and thin across the flattened side of the disk. From the diagram the holes are located across the central part of the casting, and it looks as though the gating is at fault. We suggest a little experimental work in connection with the gating and pouring. First try one mold gated in the same manner, but tilted in the opposite manner, so the metal must run up hill. It will be necessary to put a small riser on the opposite end of the casting to carry off the pressure, which otherwise might stop the flow of metal. The pouring head should be built 4 inches higher. If the castings may be run completely this way, they will stand a chance of being sound. Also use a knitting needle as a vent wire on the cope side of the mold. If this is unsuccessful, extend the runner to embrace a quarter of the disk, and cut numerous narrow gates, each in such manner the streams of metal will not impinge. If this fails, then pour *two-up*, using narrower gates. There does not appear to be anything the matter with the metal. When pouring hold the pot or ladle as close to the sprue as possible.

Bill Considers a New Foundry Product

BY PAT DWYER



EVERY Sunday after I have skimmed through the special editions of a few newspapers published in this thriving little hamlet, I make a solemn vow never to read another. I have no definite plan for passing the hours between 1 and 5 p. m., but I feel reasonably satisfied that any plan I may adopt will be better than the one I now practice. Even if I were to creep off into some retired and quiet corner and there sleep for a few hours, the net result of the day's work would be more satisfactory. I would awake refreshed in mind and body, ready to take part in any program laid out for the evening.

Under present conditions I waste part of the afternoon browsing through a flock of papers and when I get through I am tired, sleepy, cross and according to the testimony of a certain person who speaks her mind in my presence without fear or favor, I am not fit company for either man or beast.

At its best the job is aggravating. If I sit on the veranda the wind constantly is lifting some of the sheets and threatening to blow them away to that mysterious never-never land known in Ireland as Tier Na N'ogue and in this country referred to flippantly as Hellangone. The mysterious disappearance of newspapers is one of the seven modern wonders of the world. Presses constantly are turning them out day and night. Literally millions of copies are distributed daily. On a conservative basis it is quite safe to claim that there is not a town of over 1000 population without at least a weekly paper and yet when the average householder wants to take his shoes down to the repair shop, he never can find an old newspaper in which to conceal them from the neighbors while on the journey.

Have you ever stopped for a moment in your mad rush through life to consider that peculiarity of the average human being? He wears a pair of shoes on his feet without any attempt at concealment for periods ranging from 2 months to 2 years depending on what Bill is pleased to call the nature of the beast. Sometimes other contributory causes are responsible, but irrespective of the cause, he flaunts the shoes naked and unashamed before the populace for a given period. In all probability he has worn the shoes dozens of times while passing in front of the shoe repair shop, yet when the time comes to take them down for a general overhauling he insists on wrapping them in an old newspaper. He no more would think of parading down the street with a pair of naked shoes under his arm than he would of prancing down in his bare feet.

Of course Francisco partly is responsible for this craven attitude on the part of the average male citizen. After he has repaired the shoes he insists on wrapping them in an ancient newspaper before handing them to the owner or his representative. Usually the paper bursts open at several points, before the carrier arrives at his destination, but then that is to be blamed on the flimsy character of the single sheet of paper, rather than on Francisco's well meant attempt to preserve the proprieties.

So far as my observation goes no man or woman suffers the least tinge of shame or humiliation in acknowledging a puncture in an automobile tire or the necessity of sending the machine to a repair shop occasionally. Every person at one time or another has heard the old familiar "Well we left the house early enough, but would you believe it, about three blocks from the house the left rear tire—"You never heard any person explain his or her failure to keep a date because his or her shoes were in the repair shop.

The foregoing merely is a digression and after the manner of digressions in general it serves no useful purpose. I suppose in strict justice I should apologize for wasting your time, but since in all probability you are reading this in your leisure time a few minutes one way or another will exert no bearing on your efforts to lay away a dime or two against the proverbial rainy day.

At the point on the main road where I entered this little bypath I was commenting on the inherent aggravating features of the Sunday newspaper. If I attempt to read outside, the wind either whips the pages into a mess, or flies away with them altogether. If I curl up in a comfortable chair inside the house, with

HE SLIPPED ALONG WITH MODEST DOWN CAST EYES

a bundle of papers within easy reaching distance I am subjected to the activities of a more vigorous agency. Each member of the dear old family circle feels perfectly privileged to snatch any section of the paper. By the time I have finished reading the first page and am ready to turn to *col.* 5, *page* 37 *a sec.* 6, the various sections of the paper have been scattered through every room in the house. No person knows where *col.* 5, *page* 37 *a. sec* 6 is to be found and the only way to discover it is to call in all the readers and ask for a show down. Sometimes I get the required section and at other times I am told to wait. Depends on who happens to hold the section at the time.

In several instances I have started stories and never finished them on account of being unable to find the part of the paper containing the continuation. Absolute truth compels me to admit that I also have started several stories and abandoned them voluntarily even before I arrived at the continuation line at the bottom of the crowded page.

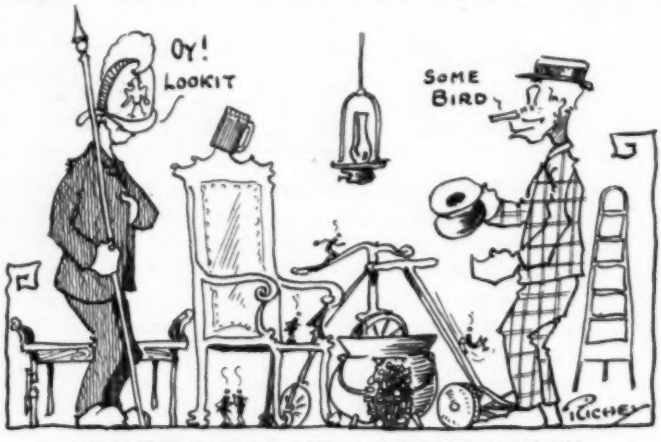
Last Sunday I started to read a story concerning the obsequies of a gentleman who had attained quite a reputation along certain lines in Chicago. From a humble beginning he had risen to power and affluence as a wholesale distributor of alcoholic beverages. Like many other successful men he had incurred the envy and emnity of some of his fellows whose efforts in behalf of thirsty humanity were not crowned by a like measure of material success.

According to their naive and primitive method of reasoning they decided if he was removed their chances of materially improving their scope of business would be increased to a considerable extent. What could be more simple? They removed him.

Four gentlemen climbed into a swift automobile one fine afternoon and cruised around the neighborhood where the party of the first part occasionally was reputed to take the air. One gentleman drove the car and his three friends balanced shot guns across their knees. They came across their victim while he leaned negligently against a lamp post, at peace with the world and without the slightest suspicion that the black automobile silently approaching was the personification of the Angel of Death.

The victim always carried a pair of guns and had the reputation of being fairly proficient in their use. The gentlemen in the automobile were perfectly familiar with these facts. Also they lacked training and instinct of true sportsmen which prohibits the shooting of standing or roosting game. According to the code of ethics which prevail in the field of outdoor sports they should have flushed the game and taken it on the wing.

Whether they committed the flagrant breach of shooting etiquette voluntarily or through ignorance probably never will be known. The tragedy was consummated so quickly that the few people who witnessed it were stunned and could furnish the police with no information that might lead to the identification of the machine or its occupants. The car was traveling in low when it passed the victim. Three shotguns appeared simultaneously and poured their contents into his head and body, then the driver threw her into high, the powerful engine roared and the machine whizzed out of sight like a streak of runaway lightning.



EVERYTHING HERE BUT A MOLDING MACHINE

With characteristic newspaper enterprise the actual details of the shooting were passed over briefly. One life more or less is of little moment in a city where more people meet violent deaths in a week than are killed in the British Isles with twenty times the population in a year. The story centered around the funeral and the many features were discussed from every angle.

If it had been possible to predict the event in advance it is quite probable that the streets would have been jammed for miles with spectators anxious to witness the shooting. However, since that contingency automatically was ruled out, the population did the next best thing and turned out to the number of approximately 5000 to have a look at the house almost concealed in flowers where the body lay in stately pomp, before it was taken to the cemetery.

With the exception of several prominent characters unavoidably detained in Joliet and others who had left the city without furnishing the police with a forwarding address, practically all the dead man's friends were present. They were determined that his passing should be marked by proper ceremonial observance and probably were buoyed up by the expectation of meeting enemies in the restless and sensation-seeking throng. The majority had been away from their native land for many years, but the spirit of the vendetta, the swift, merciless exaction of a life for a life survives both time and distance.

The morbidly curious crowd was disappointed and did not hesitate to express its regret at coming away out there just to see a floral exhibition. The select members of the inside ring who had hoped to pot a few visitors and thus over-balance the scale on the right side, were disappointed, but they did not go to the police for sympathy. They hold to the somewhat primitive idea that the police are all right in their place, but when a man has a particularly delicate little job of work to do, the proper person to do that work is the man himself.

Fortunately, the complete story including an item on the estimated cost of the funeral appeared on a single page of the paper and therefore I had no trouble in following it from beginning to end. I had just finished reading the last line which stated the police believed he had been killed for revenge or some other motive when Bill anchored himself in our midst. He gazed around at the paper littered floor and expressed the general opinion that any man who deliberately wasted the afternoon in reading what he was pleased to refer to as *that bunk* should be arrested on a technical charge of killing time.

When I directed his attention to one paragraph in the story which stated that the remains of the glorified bootlegger had been put away in a $10,000 silver coffin, Bill evinced the most lively interest and wondered if it had been cast in one piece or made from welded sheets. Unfortunately the newspaper report was silent on that point and as I never had seen a silver coffin I could not supply any information.

"I don't know," said Bill, "that the point really is of any importance.

The traffic in silver coffins probably does not assume any alarming proportions even at the best of times. The poor cannot afford them and the surviving relatives of the rich usually can see no valid reason for squandering a share of their inheritance in that manner. They figure that the wants of the living take precedence and if any money is to be spent it will be spent in a manner that will insure them receiving the full benefit. Besides, you know my dear, I think a silver coffin is nothing more nor less than an evidence of vulgar ostentation and I am sure poor dear Percival would not approve of it.

"Sometimes I wonder why some enterprising lad does not engage in the manufacture of cast iron coffins. Naturally a certain amount of opposition would have to be overcome in introducing them to a field that has been monopolized, or practically monopolized by the wood product for many years. Backed by an aggresive policy, judicious advertising and publicity which should be secured easily, the manufacturer of the new product should be able to establish himself in a short time.

"Consider for a moment the many natural advantages. Cast iron resists corrosion from earth or water better than any other material that might be used for coffins with the possible exception of copper, glass or the precious metals. These automatically are ruled out on account of the cost.

"Cast iron lands itself readily to mass production either in plain or ornamental design and may be poured into such thin sections that the finished weight will not be regarded as a handicap. Castings could be made under specially favorable circumstances in foundries equipped in a similar manner to those engaged in the production of bath tubs. Tapered patterns would facilitate molding and later the shipment of the castings in nested formation. The rough castings could be made for a few dollars each and the subsequent cost of preparation, handling, shipment and selling could be held to a point where the castings could be sold at a reasonably low price and yet one that would yield a handsome profit.

"Although, coffins constitute a dismal subject for conversation, they have their place in the general scheme of life along civilized lines and since they are a manufactured commodity I see no reason why foundrymen should not embrace the opportunity of investigating the possibility of adding them to their list.

"They are in a preferred class in many respects. For example glass bottle makers have sought in vain for years for an idea that would meet the requirements of their customers for a non-refillable bottle. Up to the present no workable device of this kind has been developed and without doubt the bottle makers and the manufacturers of bottled goods of various kinds have suffered extensive losses through the re-filling of glass containers. This condition never has arisen and probably never will arise in the coffin industry. I trust it is unnecessary to point out that once a man has used a certain coffin he never will use any other. As an added insurance and also as an item of possible interest, I might point out that up to the present no instances are recorded of any attempt to refill one of these containers.

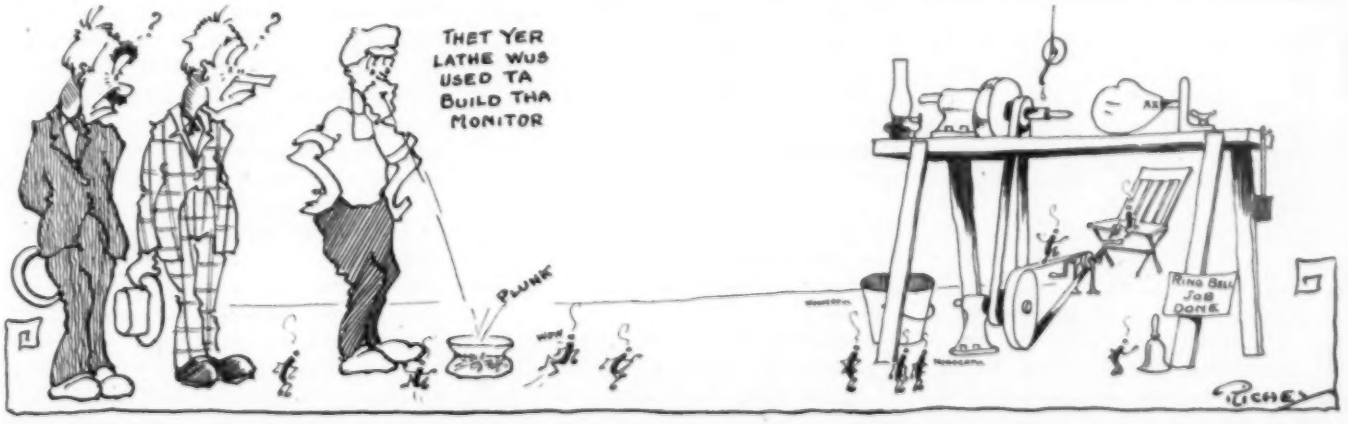
"The deeper one looks into the subject the more alluring it appears. Manufacturers of castings for machine tools, stoves, automobiles, furniture and shop equipment constantly are harassed, bedeviled, handicapped and restricted in the development of their market by the vast amount of second hand material offered for sale. Instances are not unknown of stoves that have been passed from one generation to another. There are more second hand automobiles in this city than there are voters. Second hand furniture is displayed in almost as many stores as the smooth and shiny specimens that are imported from Grand Rapids and other foreign centers.

"Talk about the nine lives of a cat! Some of that stuff out lives a dozen cats. Viewed from one angle I suppose these long-life articles serve as sterling and ringing testimonials to the materials used and to the workmanship, integrity and honest worth of the manufacturer. From the viewpoint of the man who depends on new business to keep his plant running to capacity, they don't look so good.

"Only the other day I read a statement from the proprietor of a machine shop in a small Michigan town, claiming he still has in use a lathe designed and built by John Ericsson to do some special work on the MONITOR. This famous ancestor of the modern warship was rushed to completion in 100 days; rushed to Hampton Roads without a trial trip; rushed the MERRIMAC off its feet; rushed from one blockaded port to another, the personification of death and destruction and finally was sunk off Hatteras in a howling gale in the middle of winter, less than a year after it was frantically launched to cope with the threatening sea power of the southern confederacy.

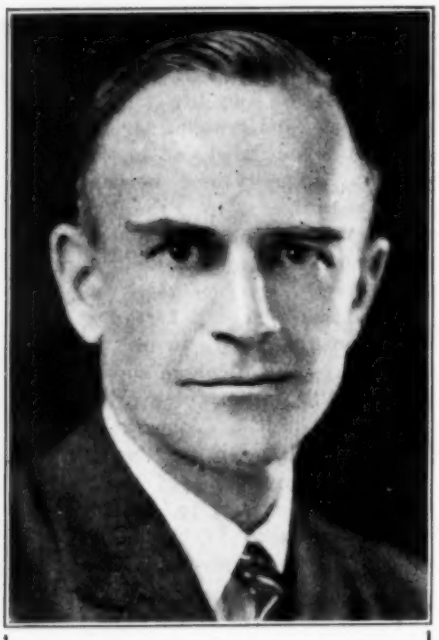
"The vessel that cost the government of the United States $275,000 and the valiant crew who manned her have been lying on the ocean bed for 63 years. One of the tools used in her construction has been in constant use since before that time and as the owner modestly remarks it may be a trifle slower than some of its modern contemporaries, but it gets there just the same. Wonderful of course, but it has prevented the manufacture and sale of at least six tools during the period of its existence.

"The coffin business may sound like something that is dead, but at least it is not handicapped with competition from second hand dealers."



ATTENTION! MY DEAR CHILDREN, YOU NOW ARE TREADING ON HALLOWED GROUND. PLEASE REMOVE YOUR HATS

Broaden Service of Testing Society



WALTER HERBERT FULWEILER, whose election as president of the American Society for Testing Materials, was announced June 24, was born in Philadelphia, Jan. 3, 1880. He was graduated from the University of Pennsylvania 1901, receiving the degree of bachelor of science in chemistry. For a year after graduation he was a chemist at the Philadelphia Gas Works. In July, 1902, he became a cadet engineer with the Kansas City Gas Co., Kansas City, Mo., and in January, 1904, he became superintendent of works of this company. He resigned in March of that year and engaged in ranching at La Ciruella, N. M. He accepted a position as engineer of the West Chester Gas Co., West Chester, Pa., in October, 1905, resigning in June, 1906 to travel. In October, 1906, he became inspector of machinery with the Philadelphia Gas Works, and in August, 1907 became connected with the United Gas Improvement Co., Philadelphia, in the department of tests. In 1913 he was made chief chemist and in 1920 chemical engineer of that company. He also was made consulting chemist with the U. G. I. Contracting Co., Philadelphia, in 1920.

ALL of the many technical and engineering organizations of the country have promotion of knowledge in their respective fields as a direct or indirect object. However, the American Society for Testing Materials, occupies a unique position. In the first place, it serves all branches of industry since all use engineering materials to a greater or less extent, either directly or indirectly. In the second place, it not only contributes to the general fund of scientific and technical knowledge of engineering materials, but it renders a definite, concrete service through the development and standarization of specifications and methods of testing—activities which have a direct economic value to industry and therefore to the public.—Annual Address of F. M. Farmer, President 1924-1925.

INCREASED activity to meet the new responsibilities which confront the American Society for Testing Materials was anticipated in the annual address of F. M. Farmer, retiring president at the business meeting of that organization held Wednesday night, June 24. The promotion of knowledge of engineering materials has come to be more truely the guiding impulse of the organization. While the society, through financial limitations, cannot carry on research, still through the activity of interested individuals and industries, it is sponsoring every increasing lines of investigation. A case in point in which the changing outlook is bringing new problems, according to Mr. Farmer, is the petroleum industry, where increased pressures under high temperatures render unsafe present standard specifications. A sustaining membership to raise funds to carry on the work of the society was suggested.

C. L. Warwick, secretary of the society called attention to the growth of the organization to 3700 members and in the report of the executive committee which he presented, made particular reference to the growing volume of printed papers and other technical information made available through the society.

Will Establish Awards

The executive committee recommended and on vote of the meeting it was decided to establish the Charles B. Dudley medal and to institute an annual lecture to be known as the Edgar Marburg lecture. These will serve as an incentive to and a recognition of achievement in engineering lines and will commemorate the lives and services of the first president and first secretary, respectively, of the society.

Embracing as it does, wide interests diversified to cover all classifications of engineering, the society has established committees to correlate activities, to prevent overlapping effort and to make its work more valuable to the industries which it serves. Reports of these general committees were presented for action at a session held Thursday night, June 25. H. F. Moore, newly elected vice president of the society and chairman of the committee on correlation of research gave a broad outline of the research work in which the organization is interested or is actively sponsoring. A few of these lines of investigation such as atmospheric and water corrosion of sheet steel, methods of corrosion resistance testing, properties of white bearing metal alloys, strength tests of cement mortars, properties of varnish, attributes of transformer oils and a wide variety of petroleum prod-

H. F. MOORE, vice president of the American Society for Testing Materials, was born in Penacook, N. H. in 1875. He attended high school at Concord, N. H., and was graduated from New Hampshire college, receiving a degree of bachelor of science in 1898 and doctor of science in 1900. He received the degree of mechanical engineer from Cornell university in 1899 and a masters degree in mechanical engineering in 1903. From 1900 to 1901 he was teacher of science and mathematics, Colby academy, New London, N. H., and for the next three years he was instructor in machine design at Cornell university. In 1904 he became connected with Riehle Bros. Testing Machine Co., Philadelphia, as mechanical engineer. From 1904 to 1907 he was instructor and assistant professor of mechanics, University of Wisconsin, Madison, Wis., and since the latter date has been assistant professor of engineering materials, University of Illinois, Urbana, Ill.

ucts give an idea of the scope of this work. A joint committee with the American Society of Mechanical Engineers to study the effect of temperature upon properties of metals is advised.

The general committee on methods of testing has defined the various terms relating to tension, compression or torsion testing. It also advanced a number of important changes in brinell hardness testing giving a wider tolerance in the 10 millimeter ball, but providing a close limit on the divergence from the diameter limit. This means that the ball must be as nearly as possible a perfect sphere, but with a wider tolerance as to its size. New methods of determination of water, and the establishment of standard practice in flexture testing of metallic materials were advanced by this committee.

F. G. Breyer, New Jersey Zinc Co., Palmerton, Pa. presented a report on sieves for testing purposes, in which the committee suggests designating sieve size by the measure of the actual space between wires in the mesh, given in terms of microns, 0.001 millimeters. Thus a U. S. Standard No. 200 would be a 74 micron sieve, and a standard No. 4 which has a opening of 4.76 millimeters would be a 4760 micron sieve.

The purchase of materials on specification was recommended by Dean Harvey, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. in a paper which gave as the advantages the ability to secure the right material, uniformity, competitive bidding with an assurance of satisfactory quality and the saving in cost of defective materials returned.

Discuss International Arbitration Bar

METAL specifications and corrosion resistance tests focused interest at the opening session of the American Society for Testing Materials held at Haddon Hall, Atlantic City, June 23. More than 200 representatives of manufacturing and consuming interests attending this meeting and many contributed to the discussion.

In presenting his report on cast iron, Richard Moldenke, Watchung, N. J., reviewed the progress of the arbitration test bar as an international standard for judging the quality of metal in the ladle. He stated that the American Foundrymen's association at its meeting in Milwaukee in 1924 confirmed the recommendation of the committee that the arbitration bar should be 1.20 inches in diameter and should be tested by a transverse load while supported on centers 18 inches apart. He also mentioned the method of removing a small bar from the casting itself for testing by shear test. This is effected by using a hollow drill to cut a cylinder from the casting. He stated that four specifications of the American Society for Testing Materials will be modified by the adoption of the new form of arbitration bar, and recommended that the matter be referred to committees for study and report.

In the discussion on this phase of cast iron tests, objection was voiced on the theory that with the new arbitration bar, comparisons with previous test results would be difficult. A factor of conversion to translate results of tests on the old bar, 1.25 diameter test on 12 inch centers, to the new type was suggested.

Enrique Touceda, Albany, N. Y., as secretary of the committee on malleable iron reported the desire of the committee to insert in present specifications a yield point requirement of 30,000 pounds per square inch minimum, the yield point to be determined by the drop of the beam. The latter method of determining yield point was questioned by H. W. Gilbert, National Malleable & Steel Castings Co., Cleveland, who reported difficulty in determining this point accurately even with specimens giving from 12 to 20 per cent elongation.

Corrosion tests were outlined at length by J. H. Gibboney, Norfolk & Western Railway Co., Roanoke, Va., chairman of the general committee who stated that the railroads estimate the rust loss to railroads at from $40 to $70 per car per year, emphasizing the need for corrosion prevention study.

E. Blough, Aluminum Co. of America, Pittsburgh, suggested in his paper on evalution of corrosion tests that both tensile and elongation tests should be made of specimens under action of accelerated corrosion tests, as such a method would disclose the effect of corrosion upon residual metal apparently unattached. The writer referred especially to nonferrous metals.

High Temperature Considered

COMMITTEE A-1 on steel of which F. M. Waring, Pennsylvania railroad, Altoona, Pa. is chairman, submitted as tentative, specifications for carbon steel castings for valves, flanges and fittings for high temperature service. The material covered is for use in valves, flanges and fittings for service up to 400 degrees Cent. These castings are to be heat treated by annealing or normalizing or both and no castings are to be quenched in any liquid medium. A range of carbon from 0.15 to 0.40 per cent with manganese under 0.50, silicon under 0.20 and phosphorus and sulphur not over 0.05 per cent are provided. A tensile strength of 70,000 pounds per square inch with an elongation of 22 per cent in 2 inches with a reduction in area of 30 per cent is specified. Bend tests in which test specimens shall be bent through an angle of 90 degrees around a 1-inch pin without cracking on the outside of the bent portion may be required at the discretion of the purchaser.

The growing importance of metals under high temperature and high stress is indicated by the attention given, both in specifications advanced and by papers and discussions throughout those sessions devoted to metals. A paper by T. McLean Jasper, University of Illinois, Urbana covered fatigue tests on steel at high temperature developed the theory that for temperatures above 400 to 600 degrees Fahr., the static test results vary with the rate at which the material is stressed. It is found that in testing annealed or normalized steel, as the temperature approaches the so-called blueing heat, the tensile strength is increased.

P. J. McVetty presented a paper which he prepared jointly with T. D. Lynch and N. L. Mochel, all of the Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., covering a series of tests on steel under temperatures ranging up to 400 degrees for varying time, some specimens being subjected to stress for a period up to 1200 hours. The specimens were heated by a resistance coil carrying current and designed to give an even heating

effect throughout the specimen. It was found that for stresses below the proportional limit, the load can be carried indefinitely at fairly high temperatures. Cast iron and manganese bronze specimens were tested under similar conditions.

A. H. Jameson, Deemer Steel Castings Co., New Castle, Del., presented the report of the committee on heat treatment of iron and steel, of which H. M. Boylston, Case School of Applied Science, Cleveland, is chairman. Tentative recommended practice for carburizing and heat treating carburized objects was offered and approved by the society.

The committee on ferroalloys offered tentative specifications for tungsten powder, spiegeleisen, ferrosilicon ferrochromium, ferromanganese, and ferrovanadium which were approved on presentation by F. C. Langenberg, Watertown Arsenal, Watertown, Mass. The committee was asked to consider the suggestion of J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. that mention of uniformity should be carried in the specification for spiegeleisen, since variation, ranging in one case from 8 to 30 per cent manganese content in supposed 20 per cent material had been encountered. L. W. Spring, Crane Co., Chicago, advised that some requirement providing against disintegration of lump ferrosilicon is needed particularly for grades in the neighborhood of 50 per cent silicon. Tentative methods for chemical analysis of ferroalloys were accepted for publication.

Directs Attention to X-Ray Studies

X-RAY applications are expanding in the study of metals according to Zay Jeffries, Aluminum Co. of America, Cleveland, who presented a complete and authoritative discussion of the subject as a report of a sub-committee on metallography. Dr. Jeffries reviewed the progress which has been made in the study of defects in castings, the possibility of correcting the design of castings to eliminate hidden defects; both through the application of X-ray metallography. These applications are particularly important in the production of castings for high duty service where failure would entail loss or disaster. As an inspection medium, the X-ray apparatus has limitations, due to the difficulty of penetrating great thicknesses of metal and also because of the cost. At present an X-ray photography of a portion of a casting costs from $1 to $5, while in the inspection of one casting as many as 40 different photographs have been found necessary. Again, further development in the apparatus is necessary. To penetrate a 10-inch section of steel, a tube using current at a million or more volts would be required. A maximum of 250,000 volts now obtains. X-ray analysis has made progress during the past year and X-ray crystallography has served to develop new facts about alloys such as the aluminum-silicon series.

E. H. Dix, Jr., Aluminum Co. of America, New Kensington, Pa., presented a micrographic study of aluminum-iron alloys of high purity. In commenting on this paper, J. H. Gibboney, Norfolk & Western railway, Roanoke, Va., remarked on the widening scope of aluminum alloys. He stated that railroads are investigating aluminum for service in freight cars, largely in valve motion parts.

In presenting the report on nonferrous metals and alloys, W. R. Webster, Bridgeport Brass Co., Bridgeport, Conn. acted for the committee due to the absence of William Campbell, Columbia university, New York, chairman of the committee. Minor changes were proposed in ingot copper base metals, white metal, aluminum alloys and in methods of analysis and testing.

That session which was devoted to ceramic products, coal, timber, rubber and slate approved an interesting report of the committee on refractories. This committee recommended no new standards, but withdrew the tentative method of testing for slagging action of refractory materials. A study of the use of refractory materials in industry is in progress. An industrial survey of the malleable industry, prepared by G. L. Morehead, Link belt Co., Indianapolis, outlines the requirements of manufacturers, and presents a tabulation of conditions encountered in air furnace bungs, sidewalls, fireboxes, bridge walls and stacks. F. A. Harvey, United States Refractories Corp., Mt. Union, Pa., secretary of the general committee, similarly classified the requirements of refractories used in the modern by-product coke oven. Both of these surveys were incorporated as a part of the report of the general committee and will serve as a grounding for future study and the preparation of specifications.

A. C. Fieldner, bureau of mines, Pittsburgh, chairman of the general committee on coal and coke presented the report of his committee in which minor revisions of existing standards are proposed. It is stated that it is possible to pulverize coke to pass a No. 60 mesh sieve by passing the material through steel roll crushers, which revolve at the same speed. This lessens the abrasive action of the coke. Tests have shown that time may be saved by pulverizing coke in ball mills, if a 200 gram portion is used instead of one of 400 grams.

A number of golf contests enabled the metals section effectively to achieve fame during the week. The A. S. T. M. cup and gold medal was won by E. W. McMullen, Simmons Co., Kenosha, Wis., while W. B. Price, Scovill Mfg. Co., Waterbury, Conn. was presented with a gold watch for the low net handicap and H. W. Bates, Pittsburgh Testing Laboratories, New York office brought in the highest gross score.

Select New Officers

President

W. H. FULWEILER,
United Gas Improvement Co., Philadelphia

Vice President

H. F. MOORE,
University of Illinois, Urbana, Ill.

Executive Committee

LOUIS ANDERSON, JR.,
Alpha Portland Cement Co., Easton, Pa.
E. F. KENNEY,
Bethlehem Steel Co., Bethlehem, Pa.
K. G. MACKENZIE,
Texas Co., New York.

Made Company Head

John F. Schurch, vice president, Manning, Maxwell & Moore Inc., New York, has just been elected president of the company and succeeds John M. Davis. Mr. Schurch was formerly vice president, T. H. Symington Co., Rochester N. Y. and before that was with Railway Materials Co., Chicago. He was graduated from University of Minnesota in 1893.

The Nugent Steel Castings Co., Chicago, manufacturer of small and thin section castings, recently has placed an electric annealing furnace in operation for the treatment of its entire product.

Make Radiator Sections
On Synchronized Traveling Conveyors

Production from One Floor Equals That Formerly Obtained from Three—Handle Sand Mechanically

By R. J. Heisserman

RECENT installation of mechanical equipment at the plant of the Richmond Radiator Co., Uniontown, Pa., has revolutionized the methods of producing the sections in half of the foundry. The results have been so satisfactory that duplicate equipment is in process of erection in the second half of the foundry where hand methods formerly prevailed. Among the claims made for the present method are that the same production now is secured from a floor area only 25 per cent of that formerly employed; experienced molders have been replaced by handymen; the payroll has been reduced from 50 to 60 per cent; if necessary the foundry may be operated continuously on three 8-hour shifts instead of the orthodox single shift of 8, 9 or 10 hours.

Under the old method in this foundry 22 molders and 24 helpers were required to make 1500 radiator castings. Since the new system was placed in force it is claimed that the molders all have been removed and the helpers now are turning out the same tonnage of castings.

The sand handling and mold conveying equipment were designed and installed by the Link-Belt Co., Philadelphia. Two circular conveyors are arranged in such a manner that the larger cuts through a 90 degree arc on the smaller as shown in Fig. 2. The large conveyor 30 feet in diameter carries the molds to the pouring zone, through the cooling section to the shakeout and returns the empty flasks to the molding circle. The second conveyor 16 feet in diameter carries the molding machines and travels under the shutes which fill the flasks with sand. The flasks are lifted from the large conveyor at a point close to where it passes under the circular molding table but the bottom plates are allowed to remain on the large conveyor indefinitely.

This is due to the manner in which the molds are made, both cope and drag halves of the flasks are barred and after the molds are made they are stacked three-high on the large conveyor for pouring. The plate on the bottom supports the stack, but no plates are required between the first and second molds or between the second and third.

The two conveyors travel intermittently instead of constantly. They also are geared to travel at a definite ratio of speed, one to the other. Thus the smaller conveyor on which the molds are made, moves through six spaces while the conveyor on which the molds are stacked moves the distance of one space. To be specific the smaller conveyor moves 5 feet every 15 seconds. The large conveyor travels 3 feet every 90 seconds.

Approximately 10 seconds are required for the conveyor to travel the 3 feet. Then the conveyor stops to afford the operators time to carry out the various features incident to coring, closing and pouring the molds. The small conveyor with a circumference of 50 feet is laid off into ten stations of 5 feet each where successive steps in the preparation of the mold are performed.

Five pairs of stripping plate machines are mounted on the molding table. The shape of the pattern used for radiator sections lends itself readily to use with this type of machine where the flasks full and empty are lifted by hand. The sequence of preparing the molds starts at the point where one conveyor is intersected by the other. Here the empty flasks

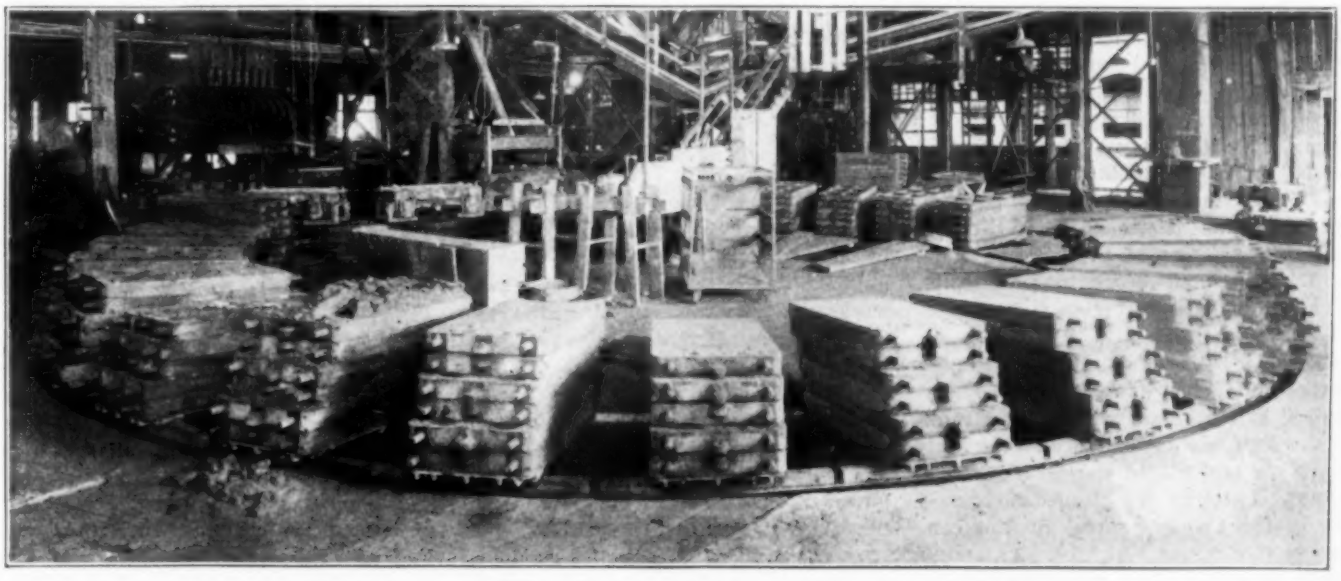


FIG. 1—MOLDS ARE STACKED THREE HIGH FOR POURING ON A REVOLVING TABLE 30 FEET IN DIAMETER

FIG. 2—THE MOLDING TABLE 16 FEET IN DIAMETER IS EQUIPPED WITH 10 DUPLICATE STRIPPING PLATES AND PASSES UNDER A SAND SUPPLY SYSTEM AND A RAMMING MACHINE

are lifted from the mold conveyor and placed on the pattern plates on the small conveyor as shown in Fig. 2. The first movement of the table brings the flask under a spout at station 2 where the facing sand is delivered. At station 3 the backing sand from a hopper falls into the flask. Surplus sand is struck off level at station 4 and at station 5 the flask passes under a ramming machine which compresses the sand to the proper density. This machine was manufactured under the direction of W. H. Watt, manager of the Richmond Radiator Co. and, it is stated, rams the sand so uniformly that each casting weighs about 4 pounds less than similar castings made in hand rammed molds.

The total saving on 1650 castings, the regular days output, amounts to considerably over 3 tons of iron per day. This is quite an item and would seem to justify the installation of the equipment and to pay for its upkeep. The machine is timed to sychronize with the rotation of the molding table and starts and stops automatically. The ramming time for each flask section is 10 seconds.

Sand is struck off flush with the flask while sprues and vent pins removed at stations 6 and 7. At station 8 the half molds are lifted from this conveyor and placed on the large conveyor. Patterns are cleaned and made ready for another round of the conveyor at stations 9 and 10. An empty flask is set in place over the pattern and the sequence again is repeated.

All the miscellaneous sand spilled around the table in the process of making the molds, including the regular amount struck from the top of the flasks at station 4, falls through a grating which encircles the table at the floor level. The sand falls on a revolving table 3 feet wide, 16 feet inside diameter, from which it is diverted by a plow into an elevator located near station 3 which in turn discharges it into a chute and thence into the flasks at station 2.

The completed molds travel on the 30-foot diameter conveyor through the pouring zone where a 600-pound ladle suspended from a monorail is used to pour two or three stacks at a time, depending on the weight of the castings. They are allowed to cool for a short distance and then the castings are shaken out and removed to the cleaning room. The sand is dumped into a hopper over a belt which conveys it to the boot of a bucket elevator. The bucket elevator delivers the sand to a hexagonal tapered screen located directly over a large storage bin. All coarse material gradually works its way out through the end of the screen frame while the sand falls into the storage bin. Sand is fed from the bottom of this bin by an apron conveyor to a tempering belt where the sand is sprayed with water and where any stray scrap is removed by a suspended magnet. When the magnet has attracted a sufficient quantity of iron it is pulled aside on its overhead trolley to a point where it automatically drops the load through a chute to the floor below.

The tempering belt discharges the sand into a standard type of revivifier adopted in Link-Belt sand handling installations, where it is aerated, cooled and mixed thoroughly. The main shaft of the machine revolves at high speed and is equipped with flat steel paddles set at an angle to drive two streams of sand forward across each other, across the center line and against a curtain of suspended rods. The rods are arranged in staggered formation and effectually break any lumps or small pellets in the sand. The temperature of warm sand is appreciably reduced. The casing to which the rods are attached is hinged at one end and mounted on cams at the other end. The motion of the cams raises the casing and lets it fall with a bump about 10 times per minute. This treatment prevents the sand from adhering to the rods or to the sides and ends of the casing.

The treated sand falls through the open bottom of the revivifier on to a belt which discharges it into the storage hopper above the flask filling station on the molding table.

Circular Plate Cracks While Cooling

Question: We have had some trouble with a circular cast iron plate 88½ inches diameter, 1¾ inches thick with twelve radial ribs 8 inches high connected by two circular ribs with a radius of 12 and 30 inches respectively. The entire plate between the ribs is perforated by ¾-inch cores set 1¾ inches apart. We have molded this casting with the flat face down in a dry sand mold and have poured the iron through two runners set at diametrically opposite sides of the mold. Each runner has been connected to the casting by two gates cut in the mold opposite two ribs. The plate has been left in the sand for 48 hours and then after we dig out the cores we find that the casting is cracked at two points on the rim between the gate branches. Iron from the plate showed the following analysis: Silicon, 2.29 per cent, phorphorus 0.57 per cent, manganese 0.54 per cent, sulphur 0.10 per cent. We shall appreciate your suggestion on how to overcome the difficulty. Do you think the trouble is due to faulty foundry practice or is the design of the plate to blame.

Answer: Your casting cracks on account of a combination of circumstances, but since you probably are more interested in the cure than the cause we shall present a remedy for

present conditions first and afterward go into some detail on the causes. About 5 minutes after the casting has been poured, dig the sand away in the center of the cope until the surface of the plate and the inner circular rib are exposed. This will equalize the cooling speed of the plate and prevent it from cracking.

The analysis of your iron is one of the contributory causes. In nontechnical language it is too brittle and short in the grain for a tricky casting of the character outlined where the natural contraction strains are accentuated by the presence of numerous ribs all on one side of the plate and rows of perforations through the web. The silicon content is fairly satisfactory, but an increase of 10 or 15 points would make it better. The same applies to the manganese. For a plain flat plate the manganese shown would be satisfactory, but in this instance, extra strong iron is required and you should raise the manganese to approximately 0.70 per cent. The sulphur also is too high for this particular casting. It should not run over 0.07 per cent. In the event that you are in a position to make up an ideal mixture along the lines laid down, you may not find it necessary to strip the center of the casting after it is poured. However, it is not advisable to take chances and even if a casting of this kind does not crack on the rim, it will contain concealed stresses that may cause trouble later, after the casting has been placed in service. Now for the cause of the plate cracking.

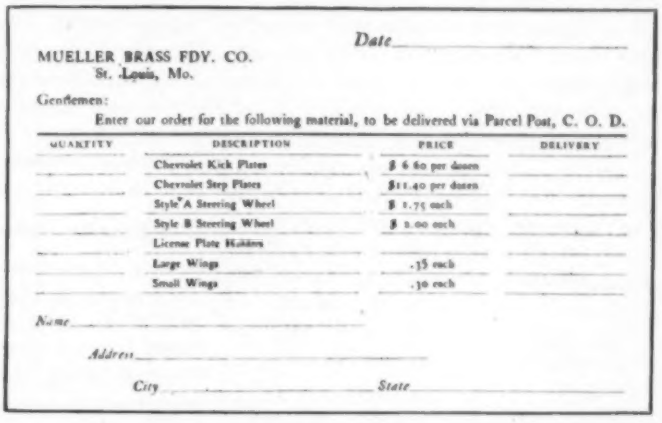
On account of the numerous ribs the center of the plate retains its heat longer than the rim. The rim contracts first and then stops. Afterward the center commences to pull and since the rim has arrived at its limit it is pulled apart more or less extensively in response to the pull exerted by the center. Naturally it cracks at the weakest points and that is between the branches of the gates. We see no valid reason for holding the casting in the sand for 48 hours. The practice does not injure the casting in any way and in a mild way perhaps, may serve to anneal it slightly, but for all practical purposes the casting safely may be shaken out any time after midnight, assuming that it is poured in the usual manner during the early hours of the afternoon.

Selling Aluminum Castings Direct

MUELLER BRASS FOUNDRY CO., St. Louis, a production nonferrous shop employing about 35 molders, had adopted a direct method of securing orders for aluminum kick and step plates. While the main commodities manufactured by this company include stick brass, railway bearings, automobile bearings and specialized castings in copper-base metals, occasional orders for aluminum jobbing castings induced the firm to study the market for that metal.

MUELLER
Aluminum Kick and Step Plates
Durable Plates of High Grade Aluminum enhance the beauty of your car and protect it from undue wear.
Designed to properly fit a
CHEVROLET
Also a complete line of Aluminum Accessories for all cars including
STEP and KICK PLATES, WINGS, EAGLES, STEERING WHEELS, LICENSE PLATE HOLDERS, Etc.
For further particulars address
MUELLER BRASS FOUNDRY CO.
Kingshighway and Tyler St. Louis, Mo.

FIG. 1—PICTURES OF THE PLATES ARE SHOWN



Date_____

MUELLER BRASS FDY. CO.
St. Louis, Mo.

Gentlemen:

Enter our order for the following material, to be delivered via Parcel Post, C. O. D.

QUANTITY	DESCRIPTION	PRICE	DELIVERY
	Chevrolet Kick Plates	$ 6.60 per dozen	
	Chevrolet Step Plates	$11.40 per dozen	
	Style A Steering Wheel	$ 1.75 each	
	Style B Steering Wheel	$ 2.00 each	
	License Plate Holders		
	Large Wings	.35 each	
	Small Wings	.30 each	

Name_____

Address_____

City_____ State_____

Fig. 2—Prices of the Articles Appear on the Return Card

A step plate similar to that shown in the accompanying illustration, was developed for a local automobile supply jobber. Later a demand for a kick plate to protect the fragile and exposed sheet metal splash strip along the side of the car led to the development of the small aluminum casting shown.

Recently the Mueller company had return postcards printed illustrating the step and kick plates, and mailed these cards to the Chevrolet dealers throughout the United States and Canada. As will be noted, the reverse card lists a definite price for the castings. The kick plates bring $6.60 per dozen and the step plates $11.40 a dozen. Prices also are given on two types of aluminum steering wheels, license plates and other specialties.

These cards will be followed by two sales letters, the first calling attention to the previous card and again quoting the prices listed, and the second containing a duplicate of the return card.

The expense of the first return card will be in the neighborhood of $360 and the follow up letters closely will approach the initial cost figure.

Only a few of the large automobile manufacturers equip their cars with accessories. Accordingly, if this plan proves effective, lists of dealers whose cars are not so equipped, will be handled in the same manner, and later the jobbers of accessories will be cultivated.

Expands Hardware Plant

On September first H. S. Getty & Co. Inc., will occupy its new building on Tenth and Thayer streets, Philadelphia. The new building will have about 10,000 square feet of floor space and cost approximately $50,000. The latest improved machinery and a complete electroplating department will be installed to obtain production on marine hardware, builders hardware specialties and other brass and bronze castings.

July first will mark the expansion of the Industrial Advertising Co., of which S. M. Fecheimer, is the organizer into an organization to be known as Fecheimer, Frank and Spedden Inc. with offices at 415 Brainard street, Detroit.

Report Status of Sand Tests-II

Description and Comment Are Presented on Various Types of Sand Testing Apparatus Together with Reference to Futility of Depending on Analyses

By H. Ries

TESTS which have been made on the same sand for compression strength, and with the American Foundrymen's association bar test have indicated that the curves of the two run more or less parallel, but that where both show a peak, the two peaks are not always in exact agreement.

In favor of the compression test is the fact that the apparatus requires little space, and that it can be used on drier sands than can the bar test. Whether it is more delicate than the bar test, is a matter of dispute.

The tensile strength test has appealed to some, partly because it was thought to measure more truthfully the type of failure occurring in a green sand mold, but the test itself does not thus far seem to have been developed so that it is capable of being used as readily and with as little practice as the compression or bar test.

Most of the experiments made for tensile strength have involved shaping the sand into a briquet similar to that used for testing cement. Such a briquet if made of molding sand has but little strength and requires the most careful handling, and has not found much favor.

A modification recently described by Wolf and Grubb* consists in ramming the sand in a core inside of a brass cylinder. This cylinder is divided horizontally, the upper and lower halves being carefully fitted, and kept clamped together while the cylinder is being rammed with sand. The lower end is then fastened to a base, the clamps removed, and tension applied to the upper half. The force required to pull the sand cylinder apart is thus measured. This apparatus is ingenious, and is claimed to be delicate, but it is not yet foolproof, and in untrained hands might give results of doubtful value.

Whether or not the bar, compression and tensile tests all measure the same stress or not, there seems no doubt that they all determine the strength developed by bonding material in the sand, and that is one thing we want to do, either in studying new sands or in daily foundry control. It is also true that all three of these tests are now in daily use in the United States for control work, being used for testing either single sands, or mixtures. The first has been standardized.

In view of the importance of permeability it is not surprising to find that many have developed apparatus for testing it. That a number of different types of apparatus have been tried in both America and Europe has been well brought out in a paper by T. C. Adams presented before the American Foundrymen's association at its Milwaukee convention.

Results Cannot Be Checked

One important feature stressed in this paper is that while all the different kinds of apparatus determine the ease with which air can be forced through sand, the permeability as determined is rarely expressed in terms of some common unit, so that the figures obtained with one apparatus, cannot be checked with those of another.

Adams points out that all the permeability apparatus fall in one of two main groups: Those which determine with the aid of a permeability formula, the permeability of the sand in some definite units (usually centimeter-gram-minute units) and those which give the permeability in some arbitrary unit which depends on the construction of the apparatus.

All results from any apparatus of group 1 are comparable. Those obtained by apparatus of group 2 are only comparable when each apparatus made after a given design is strictly standardized, otherwise the results may not be compared except with other results obtained upon the one individual apparatus.

The subcommittee on tests of the American Foundrymen's association has spent considerable time on the problem of permeability, and not only were a number of experiments made to clear up doubtful points, but several pieces of experimental apparatus were constructed.

Among the factors influencing permeability, which must be taken into consideration in devising a test, are grain size, amount and nature of bond, quantity of moisture in the sand, degree of compaction, height of sand column through which the air is passing, and pressure.

Variation in these factors brings about variation in permeability. The rate of flow of air through a sand is proportionate to the pressure causing this flow. It is also proportional to the area of the cylinder, and inversely proportional to its length.

This may serve to explain why the test committee recommended that the sand be rammed in a core of uniform diameter, height and compaction. With such a standard core of sand, we can determine the pressure required to pass the air through, and note the time required for a given volume of air to permeate the sand. We thus get results which are comparable with those obtained on other apparatus where pressure and time can be measured, provided the sand core is prepared in the same manner.

The original apparatus recommended by the committee was essentially that used at the bureau of standards. This, while accurate, was not sufficiently rugged, compact or rapid enough for foundry use, and so the committee after trying out several different types, finally evolved the small portable one which it has recommended and described in the special pamphlet already referred to. It is constructed entirely of brass, with the exception of the two short legs of the manometer tube. It is also accurate when used as a standard apparatus, and the special orifices for rapid work add greatly to its utility. Although this apparatus was recommended not over eight months ago, there are now between 50 and 60 of them in use for foundry control work in the United States.

There may be other types of permeability apparatus devised, either in America or Europe, but the writer wishes to urge that they be constructed and manipulated so that they give comparable results. Some of those described in European magazines can be easily adjusted to give the same

Transactions American Foundrymen's association Vol. XXXII, part 2.

results as those of the American Foundrymen's association.

Base permeability may be a new term to many, and needs explanation. It has been found for example that a given sand with coarse grain, but appreciable clay substance, may give a relatively low permeability when tested by itself. If now we wash the clay substance out of the sand and determine the dry permeability of the grain alone it may be found to be considerable. This is the base permeability, as stated by Dietert in a paper previously referred to. "The base permeability is of utmost importance, for it compares the permeability of all sands under like conditions. Some high clay sands are dense due to the amount of clay they contain. If natural permeability is the only thing considered, we would class these sands as closing-up sands for heap sand, while in reality they may have an open grain structure which would be shown in the base permeability reading. When the clay content of this sand is reduced by mixing it into the heap, its open grain structure would act as an opener. All new sand placed in a heap sand will be brought to some predetermined clay content by sand control. To determine what the various new sands will do to a heap sand, they should have their base permeability determined.

In any test where the sand has to be compacted, it is recognized that a varying degree of composition will affect the results. Thus with a given sand and a given moisture content, increased compaction will tend to increase the strength as measured by the methods referred to, and decrease the permeability. Recognition of this has been made by the subcommittee and the force of compaction used in the several tests is that which gives a body having the same degree of density as the average mold.

Experiments made on different sands when compacted in cylinders show that uniform compaction is not obtained from the top to bottom of the core in all cases. Thus in the permeability tests as recommended by the American Foundrymen's association, the core of sand made with the rammer is made 2 inches high, because this gives pretty uniform compaction throughout its length. A core say 4 inches high, if rammed all at once would not show uniform compaction. To overcome this difficulty as much as possible Dietert has suggested the use of double end ramming. This is done by having a movable rammer sliding into the cylinder from below. To prevent the cylinder from sliding down over it, a hole is drilled in the rammer for a pin. This holds the cylinder in place until the sand is put in it. The upper rammer is then let down into the upper end of the cylinder, and the pin is withdrawn before the sliding weight on rod of upper rammer is dropped. As a result of this equal ramming forces are applied to both ends of the sand specimen during the ramming operation and more uniform compaction results.

To determine the density one can make use of a steel ball dropped from a given height on to the sand, and then measure the diameter of the dent which the ball makes. A useful modification of this, applicable for testing the hardness of mold surfaces in any position is the apparatus described by E. Ronceray*.

Probably it is widely recognized by now that the permeability and bonding strength vary with the amount of moisture which the sand contains, and that the quantity of moisture which gives the maximum development for either the bonding strength or permeability is called the *optimum water content*. Therefore, we can plot curves showing the permeability and bonding strength for different percentages of moisture. In all of the sands first tested at the Cornell university sand laboratory it was noticed that the curves for both properties showed a well developed peak, within the moisture range at which the sand could be worked. As more and more sands were tested, it was found that there seemed to be many exceptions to this. Fig. 6 shows the permeability and bonding strength curves of over 300 sands tested within the moisture range at which the sands were workable.

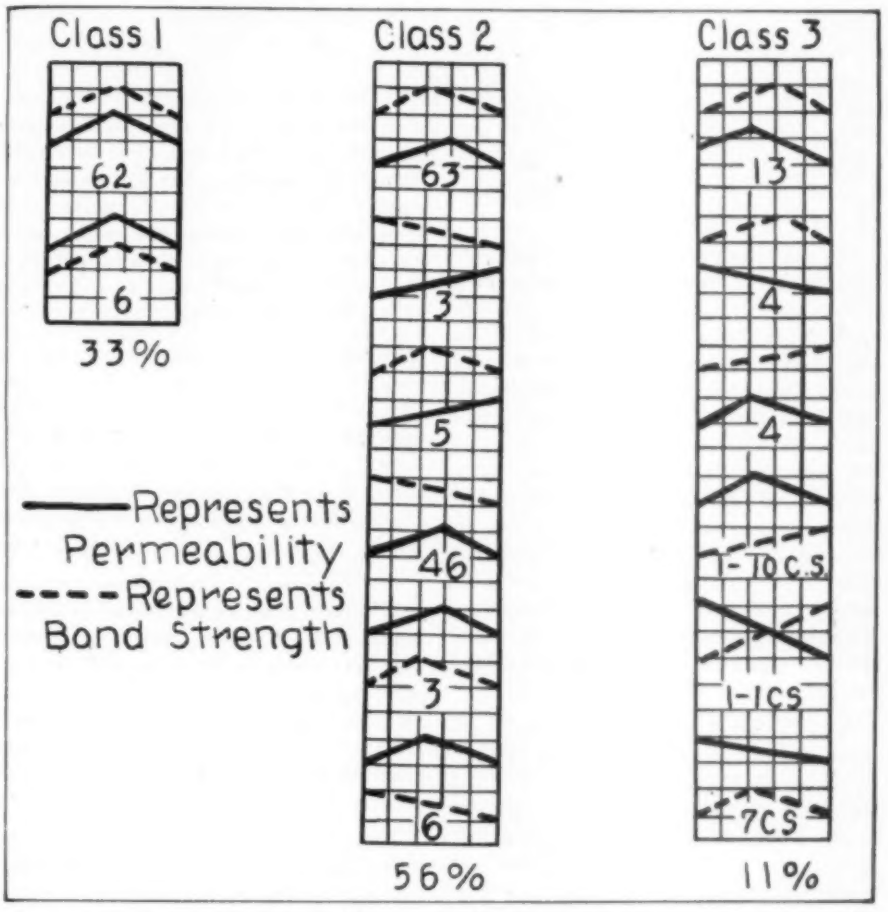


FIG. 6—PERMEABILITY AND BONDING STRENGTH CURVES OF OVER 300 SANDS TESTED WITHIN THE MOISTURE RANGES AT WHICH THE SANDS ARE WORKABLE

These have been divided into three classes, of which the upper pair of curves in each case may be taken as the type.

In Class I, the peaks of the curves agree. In Class II the permeability peak occurs at a lower moisture content than that of the bond test curve. In Class III the position of the peaks is reversed.

It will be observed that in several cases no peak is shown due probably to the fact that it is developed when

Transactions American Foundrymen's association Vol. XXXII, part 2 *Foundry Trade Journal*, May 29, 1924.

the sand is too wet or too dry to be workable.

The reason for this is evidently to be sought for in the quantity and nature of the clay substance present, and has been discussed at some length in a paper on *The Relation of Moisture to Permeability and Bond*, presented by C. M. Nevin at the October, 1924 meeting of the American Foundrymen's association in Milwaukee.

Since the amount of moisture in a sand exerts an important influence on the permeability and bonding strength, frequent determinations of it may be necessary. The common method for determining the moisture content is that of heating in a hot air bath at a temperature between 105 degrees Cent. and 110 degrees Cent. and finding the loss in weight. This is a comparatively slow process, and requires at least an hour. There is need therefore of having a rapid method applicable to all sands.

It is interesting to note, that certain short cut methods have been tried with some success in foundry control work where the same sand or sands are daily in use. F. L. Wolf and A. A. Grubb* use an apparatus consisting of four electric heating chambers arranged to pass dry air at about 400 degrees Fahr. through as many samples of sand contained in small aluminum capsules. There is also an automatic weighing device equipped with a chart that indicates the percentage moisture without calculation. A single test takes from five to eight minutes and 30 to 40 determinations can be run in an hour.

H. W. Dietert*, has devised another short cut method based on the following principle; if a tube is filled with water, and moist sand is put in it, the amount of water displaced will depend on the amount of water already contained in the sand. A definite amount of moist sand therefore is put in a water-filled cylinder. The water displaced overflows and is caught in a graduated tube, from which graduations the percentage of moisture in the sand can be read.

Refractoriness and life, according to the writer's conception do not mean the same thing. Refractoriness would seem to apply to the temperature at which a sand fuses; life refers to the length of time a sand can be used over and over without losing its important properties. We have as yet no standardized method of determining either of these properties, but studies leading to that end are under way. Refractoriness is a matter of greater importance in steel casting than in the casting of other metals because the former is poured at a higher temperature than many ferruginous sands would stand. It is not, however, always lacking in interest for all foundrymen.

There seems to be a diversity of opinion as to how a refractoriness test should be made, one group holding that the fusion point of the sand as received should be tested, while others believe that it is more important to determine the refractoriness of the bond alone. The writer is inclined to agree with the latter group, because in most sands it is the most resistant minerals such as quartz which compose the grain, and these are usually of high refractoriness, while the bond commonly contains fluxing impurities which lower its fusion point. If then the bond fuses, the sand as a whole not only loses its strength, but the fused material fills the pores and makes the mass sticky.

There have not been many figures published on this point in the United States, but some interesting ones have appeared in a paper by Rhydderch*. Aside from the fusion point of the sand, it is the opinion of many that the vitrifying point or softening point of the sand as a whole should be determined.

Whether it is decided as advisable to make both a fusion and a vitrifying test of the sand, we have still to consider whether they should be made in an oxidizing or reducing atmosphere. It would seem that in a relatively narrow zone next to the metal, conditions are reducing.

Experiments looking toward the development of a standard method for testing the refractoriness of sands are now being carried out under the direction of the subcommittee on tests of the American Foundrymen's association.

There is no doubt that other things equal, some sands deteriorate more rapidly than others, and require a larger amount of new sand to be added to the heap from time to time. We should not overlook the fact that the life of a sand will be influenced by the size of the casting made in it. Admitting that some sands burn out quicker than others, those sands which have a longer life, or burn out less rapidly are the more desirable, and if this quality can be determined before hand, it may mean a considerable saving to the foundrymen.

Experiments are now under way to test out a method useful for this purpose. One suggested and used by H. W. Dietert and some others consists in heating the sand to a temperature of 600 degrees Fahr. for two hours, after which it is tested to determine its change in permeability and bonding strength. This test gives promise of being a reliable one. Mr. Dietert* has found that some molding sands lost as much as 87 per cent of their strength by this heat treatment while others lost as little as 16 per cent. Curiously enough the permeability may either increase or decrease.

One of the supplementary tests recommended by the subcommittee on tests is that of dye adsorption, the object of which is to determine the nature and amount of the clay substance in the sand or to state it in different language, the colloidal matter. Theoretically, if a sand contains a high percentage of bonding substance it should show a high dye adsorption and vice versa.

It cannot be said that there is unanimity of opinion regarding the value of this test, and moreover while it is true that a sand of high bonding strength may show a high dye adsorption, and vice versa, still it seems as if in many cases there is only a general relation between the two properties.

Dye adsorption is a surface phenomenon, and colloidal matter because of the great surface area of the particles would naturally adsorb a relatively large amount of dye. But would not silica flour or fine silt also show the same property, and although it exhibits it to a less degree, we can easily see if a sand contained a considerable percentage of fine silt, that its dye adsorption might be appreciable. Then too, sands which have been heated to redness, a temperature sufficient to destroy all true bonding material may still adsorb some dye. So from these facts alone we may conclude that it is not the colloidal bond only which takes up the dye.

To go still further. Holmes in a paper familiar to many, has called attention to the difference between mobile and static bond. According to Gramme's experiments quoted by Lemoine* the static bond seems to give little or no strength to the sand. May this static bond not also adsorb some dye?

Finally in the dye adsorption test

Transactions American Foundrymen's association Vol. XXXII, part 2.

Transactions American Foundrymen's association Vol. XXXII, part 2.

Transactions American Foundrymen's association Vol. XXXII, part 2.

as usually carried out, the dye used is crystal violet which is an acid dye, and hence would be adsorbed best by basic colloids. Might there not be acid colloids present which would react best toward a basic dye like for example saffronine? The concentration of the dye also plays an important role, and must not be overlooked. Notwithstanding these objections which have been raised against the dye test, it has been found useful by those who have used it satisfactorily in foundry control work. This may be due in part to its being employed for testing different lots of the same sand. In looking over the literature one notices that chemical analyses of molding sands appear to have been made more frequently in Europe than in the United States, which might lead one to believe that greater importance is attached to them in the former. The subcommittee on tests has recommended a method for analyzing sands, which is practically the same as that ordinarily used, but a quantitative analysis is not regarded as essential in all cases.

It would be no doubt of importance in steel sands, and even many core sands, but for ordinary molding sands the writer fails to see that it can perform any real service. As pointed out by him some years ago it is not difficult to find brick clays that show a chemical composition identical with molding sands.

If we had a satisfactory and accurate method of making a rational analysis, which was applicable to impure materials, it might give us some interesting data, but such a method has not been discovered so far as I am aware. Neither does the writer place much reliance on the method of calculating the rational composition from the ultimate analysis, especially if the sand contains considerable bonding substance.

The writer believes that in the mineralogy of molding sands we have an interesting field for study which may lead to practical results. It involves considerable careful petrographic work which should be checked up with practice. Molding sands are likely to be made up largely of the more resistant minerals, such as those which withstand the destructive effects of weathering and erosion. Of these quartz would be the most common, but we sometimes hear the statement made that minerals of relatively low weathering resistance, like feldspar may be present in considerable amounts. Is this really so, and if it is, do they play any role in the behavior of the foundry sands, which should be considered, and may effect their commercial value? The statement also is made that mica is injurious. Is it really present in any considerable amount, and what is its effect? Lime and the alkalies are not considered as desirable. If present are they there as constituents of mineral grains or otherwise? Numerous other questions will suggest themselves and while a petrographic study is being made of the sand grains, their form also should be considered to determine what effect this has on the properties of the sand. In the microscopic study of sands we have a large and interesting problem.

No reference has been made as to whether the tests discussed are for green sand or dry sand, although their applicability may be inferred.

The bar test and tensile strength assumedly are for green sands. The compression test can be made on either green or baked sands. The same holds true of the permeability test. Baked cores are sometimes tested by fastening them in the end of the cylindrical sand container, making a paraffin connection and coating the sides of the core with paraffin. This permits air to be forced through the full length of the core.

Baked cores sometimes are submitted to a crossbreaking test, and two of the compression machines now being tried are adapted for testing bars by crossbreaking.

Before closing this brief review the writer desires to emphasize again the practical value and broadness of application of some of the tests which have been suggested. Tests like those for strength, permeability, fineness, life and refractoriness are any or all of importance. They may be applied to new sands for the purpose of determining how they compare in their properties with those already in use. They may be used by the sand producer to check his shipments and determine whether they are running uniform. The foundryman can use these tests to check new shipments from the sand bank, so that if they do not agree with satisfactory sands from the same bank previously received, he can reject the car load. This actually is done. Last but by no means least the foundrymen can use these methods for daily foundry control, employing them as well for sand mixtures, as for individual sands. He may find that if his heap maintains a certain moisture content, permeability and strength, all goes well, but that if there is too much deviation from certain figures the losses at once become noticeable.

Faked Foundry Facts

The Overhead Burden

Makes Emergency Worm Wheel Casting

By Eugene Barr

While bringing the 10-ton ladle from the yard where it had been dried, an accident occured by which the worm gear was broken. A mold for a 7-ton casting was in the floor at the time and the customer was in a hurry. Waiting to effect a repair in the usual manner would have involved the loss of several days. Fortunately the superintendent was a foundryman of the old school in which common sense and an all around knowledge of the trade served to meet emergencies as they arose from day to day. This particular instance was only one more added to the long list.

The broken wheel was removed from the shaft and taken to the coreroom where it was mounted on a plate and a ring of core sand packed around it. The ring was cut into eight segments, drawn away from the wheel and placed in the oven to dry. The broken wheel then was used for a pattern and a mold was made from it in a suitable flask. The cores were dried by the time the mold was ready and the casting was poured at 3 p.m. the same day. On the following morning it was sand blasted and the teeth were finished by a small portable

emery wheel, ¼ x 4 inches. An hour later it was drilled and back in place on the ladle. It was a shade tighter than the original wheel on account of the shrinkage, but the teeth meshed nicely and the casting was poured satisfactorily only one day behind schedule. Time on the job included 1½hours for the coremaker, 1½ hours for the machinist and 2 hours for the molder. Thus by exercising ingenuity, much time was saved.

Distributing the Burden of Overhead

BY H. P. KELLER

MANY foundries now are using a method of overhead distribution which to as great an extent as possible apportions the cost accurately over a series of groups. The total of the first group in the accompanying table is found by careful study of the ledger and material records. An average of charges and usage is taken for a period of three or four months. Items entering this classification are determined by policy or by the individual opinion of a competent person.

A—Plant Overhead

Insurance on buildings
Insurance on executives
Insurance on machinery
Taxes—city and county
Water—electricity—gas
Repairs to buildings
Repairs to equipment
Interest and discount
Depreciation
Tools and fixtures
Compensation insurance
General supplies
Fuel
In freight

The third group is made up of charges directly chargeable to the castings. Materials used in the cupola and core departments are grouped under suitable headings as shown in group *B*.

Plant overhead is distributed over the various departments in proportion to the percentage of floor space occupied by each department. Assuming for purpose of illustration that the foundry is divided into the following departments: Molding, melting, cleaning, grinding, shipping, coremaking and patternmaking a definite allotment of the overhead may be assigned to each.

For a theoretical cost over a two-week period, the molding department allotment on this basis is 960.82. When this is divided by the total net weight of salable castings for this period the result will be the charge of plant overhead for the molding floor. For example on a cost of $960.82 and a production of 308,511 pounds, the factor is 0.0031 cents per pound.

The overhead allotment for the cupola is $282.48. When this amount is divided by the net pounds of production including both salable castings and those retained for shop use, in this instance 315,825 pounds the resultant factor is 0.0009 cents per pound. Cleaning, grinding and shipping departments have a plant overhead apportionment of $639.38. On the same basis as the others this gives a cost factor of 0.0020 per pound.

B—Cupola and Core Departments

Coke
Limestone and flux
Fire clay
Pig iron
Scrap
Core sand
Core oil
Core paste
Core rods
Pitch compound
Gas or coke for ovens
Blacking

In addition to determining the overhead allotment by floor area the core department presents further refinement. The result obtained from the first calculation is divided by the weight of the net salable cored castings. To get a job cost, it is advisable to distribute the overhead by the percentage on direct labor method. Where this is done the core costs easily overlooked on individual jobs, stand out significantly. Plant overhead charge on the pattern shop is found in the same manner as that for the molding floor.

C—Castings Overhead

Molding sand
Insurance on castings in transit
Materials for new flask and repairs
Operation of sand mixer

Overhead for castings as outlined in group *B* is not distributed by departments but is entered on the cost sheets as a separate item. The average cost factor is found by dividing the allotment over a specified period by the weight of the salable castings. A different procedure is required to find the cost of an individual job.

A chart is prepared showing the percentage of space occupied by each molding floor. For example, assume that the casting overhead for a two-week period is $1736.08. The molds occupied 5.03 per cent of the floor area in production over that period. According to the method already outlined the amount chargeable to this floor is $87.32. However, the job only was on the floor for 64 out of a total of 96 elapsed working hours, therefore the percentage of time to be applied is 66. The time chargeable to the job is 66 per cent of $87.32, or $57.63. Dividing this by the weight of the net production it is found that the casting overhead for this job is 0.0176 per pound.

Racoon in Blast Pipe

By Robert E. Masters

When the Mexican National railroad established its shops at Laredo, Tex., the writer was sort of a godfather to the project. His company had been furnishing castings for car and engine wheels, and with the exception of light car castings, continued to do so after the shops were completed. Thomas Milan, superintendent of motive power and later president of the Vera Cruze Pacific and the writer had been friends for years; in this case the former was utilizing the foundry knowledge of the latter.

The Mexicans laid the blast pipe underground to a point just back of the cupola, and at quitting time went away leaving the pipe open at the ground level. The next day the remaining connection was made. When the blast was turned on, no air came through, indicating that the pipe was dammed. An investigation revealed that a big racoon had gone into the pipe the night before when it was open and was jammed up against the oblong connection.

French Engineers Consult Detroit Firm

Leon Thomas and Mr. Genot of the Andre Citreon Co., Paris, France recently spent a week with the Miller-Hurst Corp., General Motors Building, Detroit in consultation on the new Andre Citreon foundry. The Miller-Hurst organization did the preliminary engineering work on the Citreon foundry which is one of the largest outside of the United States.

Mr. Thomas is vice president of the National Engineering Society of France and is also chief engineer of the Andre Citreon Co. Mr. Genot is the New York representative of Andre Citreon.

Collects Sand Samples in His Spare Time

EUGENE W. SMITH whose permanent address for over 50 years has been the Crane Co., Chicago, recently listed himself at several post offices where mail will reach him when he was appointed general foundry superintendent of all plants operated by the Crane Co. in Chicago, Birmingham, Ala., Chattanooga, Tenn., Bridgeport, Conn., and Montreal, Quebec. At periodic intervals he will let the light of his countenance shine on these various plants and see that they are functioning in a manner to merit whole hearted approval.

This new position will give him an opportunity to delve into sand, a problem that has engaged his attention, you might say, as man and boy for half a century.

Eugene was born in Cincinnati May 17, 1858, but did nothing further to distinguish him from the great army of Smiths until he was a trifle over 14 years old and living in what then was regarded as the thriving hamlet of Chicago. He felt that he had wasted a sufficient portion of his life attending school and one thing or another of a like trivial character. He realized that life is real, life is earnest and that if he intended to make a mark on the sands of time it was up to him to grab off a job for himself where the sand was plentiful. He entered the service of the Crane Co., December, 1872 as an apprentice in the malleable foundry and liked the people and the surroundings so well that he decided to give the place a thorough trial before seeking employment elsewhere. He has just completed 53 years continuous service in the one plant and practically has decided that the job shows every evidence of being fairly steady.

The Crane Co., celebrated its seventieth anniversary on May 15 with suitable ceremonies and among other features presented veteran employes with tokens of appreciation. On this occasion Eugene Smith's name, like that of Abou Ben Adhem on a certain memorable occasion, led all the rest. For continuity of service he has built up a record approached by but few men in the foundry or for that matter in any other industry. His active career closely parallels the entire existence of the Crane Co. He is president of the veterans association which numbers among its members many who have been with the company for 40 years or more.

Twenty-five years is the minimum period through which an employe may qualify as a veteran. He then is presented with a solid gold medal. At the completion of each additional 5 years he is entitled to a solid gold bar. Gene now has five of these bars and as the original designer of the ribbon never contemplated the possibility of a claim being presented for a sixth, all the available space is occupied. A special amendment to the constitution will be in order to lengthen the ribbon when Gene steps forward shortly to claim his sixth bar. Already he has shattered one of the standing rules of order by which an employe automatically is retired when he arrives at the age of 65. Eugene ran over the period by three years and then was promoted to a more responsible position. What's the answer? Sand!

His conception of an ideal vacation is one spent in the wilds away out back of beyond where unhampered he might prospect for traces of sand and then follow from the outcrop back to the mother lode. In the pursuit of his hobby he has explored Michigan, Illinois, Indiana, Wisconsin and Ohio and through correspondence has secured samples of sand from practically every country in the world. He starts out blithely with a couple of grips filled with clothing and other usual materials carried on a camping trip. When he returns the clothing etc., has disappeared and the grips are filled with catsup bottles, pickle bottle, mason jars, peruna bottle and pop bottles containing samples of sand from every deposit within a two-week cruising radius.

Close hard study over an extended period convinced him that the condition and quality of the sand exercised an important influence on the relative size of the scrap pile. Eventually he developed the vibratory test, now always associated with his name.

At the foundry laboratory and at his home in Oak Park he has samples of more than 1000 varieties of sand. He is regarded in the foundry industry as the dean of sand research and probably has done more work than any other single man in developing practical methods for judging quickly the foundry possibilities of sand. Within reasonable limits he advocates the use of local sand and insists that in the majority of cases it may be adapted for use instead of sand that is imported under a heavy freight rate. Mr. Smith was a charter member of the Western Foundrymen's association and has twice been president of the Chicago Foundrymen's club.

The Shakeout

DAN M. AVEY, Managing Editor
PAT DWYER, Engineering Editor
CHARLES VICKERS, Nonferrous Editor
FRANK G. STEINEBACH, Associate Editor

¶ Shoemaker and His Last

ONE of the everlasting seven wonders of the world is the calm assurance with which the average man rushes in to give advice on a subject on which he has little or no knowledge. Every man is convinced firmly that his own particular line of endeavor presents problems that call for the highest degree of skill, knowledge, training and experience. Conversely he also is firmly convinced that the problems of the other fellow are only child's play.

A FAVORITE old bromide is that the man engaged in a particular calling is so close to his work that his view is distorted, he has not the proper focus. An outsider from his favored position has an accurate perspective.

A recent instance of this kind appeared in a technical paper where a writer who blandly admits he is not a foundryman criticises an article in a previous issue describing the method of gating a number of small flat patterns. The wise man declares the arrangement is criminally wasteful of space. He would arrange the patterns closer together on edge and place twice as many patterns in the same flask. He is blissfully ignorant of the fact that with his proposed arrangement so much steam would be generated in the narrow bodies of sand that it could not escape in time and all he would get for his effort would be a bundle of blow-holed scrap from each flask. The shoemaker may be dumb but he knows the limitations of his last.

¶ What Makes the Wheels Go?

COMPARATIVELY few foundrymen have the time, the patience, the training or the opportunity to investigate the properties of sand after the manner described in practically all the papers on the subject presented up to the present. The average foundryman is a matter of fact kind of a person, and he is more bewildered than enlightened by the vast array of charts, theories and tables of logarithms that bristle alarmingly through all the papers and discussions. Plaintively, impatiently or aggressively, depending on his temperament, he wants to know why some investigator does not come out flat footed with a simple method by which he can determine accurately whether his sand is suitable or not.

THIS attitude of course reflects the universal craving for speed, a desire to arrive at the goal without any conscious effort. Today practically every person of adult or near adult age can drive an automobile, but that is a long way from claiming that each of these persons is familiar with the theory of the internal combustion engine. At times one is tempted to doubt if some of these drivers possess even ordinary intelligence. Sitting in the driver's seat they know the machine will go through a definite series of evolutions when they pull or push certain levers with their feet or hands. Knowledge of how and why the engine responds to a touch is not necessary.

Some place, some time, some men had to carry on exhaustive tests before an internal combustion engine was developed to a point where it became a commercial possibility, or before it was refined to a point where its movement could be controlled by a child. In all probability the problem of testing sand eventually will simmer down to a point where a solution will be within the reach and understanding of the ordinary foundry worker.

¶ Electric Heating Grows

GRADUAL improvement in the field of electrical engineering is having a pronounced effect on the type of industrial heating equipment being used in numerous manufacturing lines. Builders of electrical equipment have been quick to see the advantage of progressive pioneering in various industrial fields, and have designed heating appliances and devices for a variety of processes, which have proved practical and economical. Numerous factors have contributed to the growth in the number of installations of this type of equipment, among which may be advanced uniformity of heating, possibility of accurate temperature control, low labor cost, and low maintenance cost. A certain amount of flexibility has been developed in shifting the heating elements to obtain the heat distribution desired in the oven and furnace.

MUCH of the industrial heating equipment in use today is employed in the metal working industry, a variety of applications being found in the foundry field, including ovens for annealing, for baking cores and molds and for use in the experimental laboratory, devices for heating molds and glue pots in the pattern department, and furnaces for melting both ferrous and nonferrous metals. Perhaps the future of this system of heating depends on further refinements and improvements and also on the success of the attempts to produce electrical energy at a low cost.

Trade Outlook in the Foundry Industry

SEASONAL declines are apparent in foundry operations, although it is significant that the slowing down is not limited to any one class of production. Competing foundries in many instances show widely different rates of operation and orders more than ever are governed by the ability to get business. Jobbing shops are busy in many instances upon miscellaneous work, and while no backlog of bookings is accumulated, the orders seem to keep slightly in advance of immediate need. In the vicinity of New York City, jobbing conditions are reported poor, with operations only about 40 per cent of capacity.

Steel Shops Slacken

Summer always affects steel foundry operations adversely. At this time work is slack, particularly in railway specialty lines. Malleable foundry operations also have declined, according to the department of commerce, the May operations were 53.9 per cent of capacity, compared with 55.1 per cent for April, while the orders booked by 130 identical plants had dropped from 58,001 tons in April to 50,594 in May. Robert E. Belt, secretary of the American Malleable Castings association has developed some interesting comparisons between the various classifications of malleable castings. These show that in the period from January to May inclusive, the following facts are true: Automotive malleable castings formed 44 per cent of the total production in 1925, against 46 per cent in 1924 and 47 per cent in 1923. Further, railroad malleable has gained in comparison with the total of malleables produced, ranking at 24 per cent in 1923, 28 per cent in 1924 and 29 per cent during the present year. These figures are based upon the output of member plants composing the association.

Prices for Raw Materials for Foundry Use

CORRECTED TO JULY 8

Iron		Scrap	
No. 2 foundry, Valley	$18.50	Heavy melting steel, Valley	$17.00 to 17.75
No. 2 southern, Birmingham	18.00 to 19.00	Heavy melting steel, Pitts.	17.00 to 17.50
No. 2 foundry, Chicago	20.50	Heavy melting steel, Chicago	15.00 to 15.50
No. 2 foundry, Philadelphia	20.76 to 21.76	Stove plate, Chicago	15.75 to 16.25
No. 2 foundry, Buffalo	19.00	No. 1 cast, Chicago	19.50 to 20.00
Basic, Valley	18.00	No. 1 cast, Philadelphia	17.50 to 18.00
Basic, Buffalo	18.50 to 19.00	No. 1 cast, Birmingham	16.50 to 17.00
Malleable, Chicago	20.50	No. 1 cast, Buffalo	16.00 to 16.50
Malleable, Buffalo	19.00	Car wheels, iron, Pittsburgh	16.50 to 17.00
Coke		Car wheels, iron, Chicago	17.00 to 17.50
Connellsville foundry, coke	$3.75 to 4.25	Railroad malleable, Chicago	17.50 to 18.00
Wise County foundry, coke	4.50 to 5.25	Agricultural, mal., Chicago	16.50 to 17.00
		Malleable, Buffalo	17.50 to 18.00

Autos Hold Pace

Automobile production has continued to hold its own through June, although sales of passenger cars are not so active as during the preceding months. The total output of all classes of automobiles in the United States and Canada, during May was 426,017 compared with 439,117 for April and 377,247 for March. The fortunes of automotive foundries follow closely the sales success of the individual cars for which they make castings. Cast iron pipe demand still is strong. Shipments of French and Belgian pipe arriving at seaboard give domestic producers little concern, for it is felt that with the present demand, the capacity at present available will not be increased, the foreign shipments serving to take up the excess. Orders for sanitary ware continue heavy, according to the department of commerce. The May orders for bath tubs mounted to 121,659 compared with 109,670 for the preceding month. Orders for lavatories, sinks and miscellaneous ware also increased. Unfilled orders have commenced to climb.

Low Point Reached

Pig iron production for June, according to statistics compiled by the *Iron Trade Review* totaled 2,678,992 tons, compared with 2,933,907 for May, giving a loss of 8.7 per cent. On a daily average basis, the June rate was 89,299 tons per day, compared with 94,642 tons per day for the preceding month and on this basis, the loss was only 5.6 per cent. Further, May showed a loss of 11.5 per cent compared with April when the daily average production is considered. This gives evidence that the low point in production is approached. Merchant iron output for June was 556,644 tons, compared with 605,347 tons for May. On a daily average basis the June rate was 18,554 tons per day, compared with 19,527 tons per day showing a decrease of 973 tons or about 5 per cent. During the past month no new merchant stacks were put in operation and one was blown out. General conditions affecting the foundry industry continue to improve. The machine tool industry, long in the doldrums is looking up. Farm prosperity is promised. The purchasing power of the farmer stands at the highest point since 1920. Foundries operating on power units, notably oil burning engines are active. The demand for sugar mill machinery is strong and supports a fair demand for castings. Steel mill operations continue at a high rate, with the consequent effect upon the demand for machinery and rolls, although buying in the later instance still is on a hand-to-mouth basis. Building contracts awarded show this summer to be fully equal to the past.

Nonferrous Operations

Brass foundries are fairly active Nonferrous prices, according to New York quotations in the *Daily Metal Trade* of July 8, follow: Casting copper, 13.37½c; electrolytic copper, 13.87½c to 14.00c; Straits tin, 57.50c; lead, 8.20c; antimony, 18.50c to 19.00c; nickel, 38.00c; No. 12 alloy, remelt aluminum, 22.50c. Zinc is 7.10c to 7.12½c, E. St. Louis, Ill. Average monthly prices for June follow:

New York Prices

Castings Copper	Electrolytic Copper	Lead	Tin Straits	Antimony	Aluminum 98-99	Zinc St. Louis
13.05	13.655	8.10	55.87	16.60	27.00	6.99

Personal

C. C. Crial has become field representative for the Franz Foundry & Machine Co., Akron, O.

J. N. Klock, former mayor at Benton Harbor, Mich., has been elected president of the General Die Castings Co., this city's newest industry.

Harvey P. Dawrs, mechanical engineer for the Huron Industries, Inc., Alpena, Mich., formerly was assistant engineer for the Industrial Works, Bay City, Mich.

Harold E. Phelps formerly connected with the Fairbanks Steam Shovel Co., Marion, O., has been made superintendent of the steel foundry of the Dayton Malleable Iron Co., Canton, O.

Fred Erb has resigned as foundry superintendent of the Packard Motor Car Co., Detroit. Mr. Erb was graduated from the University of Michigan in 1908, becoming connected with the Detroit Foundry Co. He has been with the Packard company 12 years and has served as president of the Detroit Foundrymen's association.

G. H. Clamer, president, Ajax Metals Co., Philadelphia, will sail on July 10 for Europe. He is scheduled to deliver a paper to the Association Technique de Foundrie de France but the postponment of that meeting until September will necessitate the paper being read in his absence, as he expects to return before the date of the meeting.

Randolph Crompton of Worcester, Mass., has been elected vice president and director of the Hopedale Mfg. Co., Milford, Mass. Mr. Crompton was at one time managing director of the Crompton Loom Works and later was vice president and general manager of the Crompton Works of Crompton & Knowles Loom Works. Recently he has been manager of the loom department of the Mason Machine Works, Taunton, Mass.

Enlarges Welding School

To cope with the advance of arc-welding the Westinghouse Electric & Mfg. Co., East Pittsburgh has enlarged and centralized its school for training of arc welders. In this school, which is open for all Westinghouse employes and also to men from outside companies, the students will be given a progressive course of study and application. The work, at first, simple, will develop as the men progress, into the more complex and difficult problems of arc-welding. The school itself is divided into booths, so that each student may work out his own problems undisturbed and unhampered.

The newly enlarged school has been re-equipped with the up-to-date apparatus including a 1000 ampere motor generator arc-welding set, with six outlet panels; arc-cutting apparatus, varying from 400 to 600 amperes; a portable 200 ampere arc-welding set and other necessary equipment.

Steel Companies Unite

Information to the United States department of commerce from British India states that the Bengal Iron & Steel Co. and the Indian Iron & Steel Co. have merged their interests. At a meeting of the Indian Iron & Steel Co. in London it was stated that the company can produce pig iron more cheaply because of its modernized plant, while the Bengal company has a profitable business in its foundries and its cast iron pipe department. The Bengal company also builds railroad sleeping cars, although little activity has existed in this department of the works for some time. However, the general foundries and the pipe foundries are occupied fully. The demand for tubular products in India is heavy, and instruction have been given by the Bengal Iron Co. for the erection of an additional pipe foundry.

Appointed Sales Manager

Raymond B. Hosken has been appointed general sales manager of domestic sales of the Sullivan Machinery Co., Chicago. Mr. Hosken has been attached to the sales department of that company since his graduation from the University of Michigan in 1910. After four years in the local sales department at Chicago, he was appointed Australian manager with headquarters at Sydney, N. S. W., where he remained until 1921, when he was appointed assistant to Howard T. Walsh, vice president in charge of sales at Chicago.

Company Changes Name

Federal Mfg. Co., Columbus, Ohio has changed its name to Federal Brass & Mfg. Co. and has removed its factory and general office to Marysville, Ohio. No change is made in personnel or organization. Federal Brass & Mfg. Co., specializes on hose, gas, stove and range cocks, and gas and electric fixtures. Scott Van Etten is secretary and general manager.

Officers Are Nominated

A. B. Root, Jr., mechanical engineer, Hunt-Spiller Mfg. Corp., was nominated for president of the American Foundrymen's association at a recent meeting of the nominating committee. S. W. Utley, vice president and general manager, Detroit Steel Casting Co., Detroit was nominated for vice president. These officers serve for one year.

Other nominations were Fred Erb, until recently foundry manager, Packard Motor Car Co., Detroit; C. E. Hoyt, secretary, American Foundrymen's association, Chicago; Jesse L. Jones, metallurgist, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; L. W. Olson, works manager, Ohio Brass Co., Mansfield, Ohio; Herbert S. Simpson, president, National Engineering Co., Chicago, to serve as directors for a term of three years.

The nominating committee was composed of past presidents W. R. Bean, chairman, C. R. Messinger and G. H. Clamer, and members elect W. W. Cheney, Robert Crawford, S. T. Johnston and T. Raymond Scott.

The Johnson Mfg. Co., Minneapolis, manufacturer of industrial oil burning equipment, has appointed Otis B. Duncan, 53 West Jackson boulevard, Chicago, as representative for the Chicago territory.

Obituary

Edward S. Reid, vice president and chief engineer, Northern Engineering Works, Detroit, died recently at the age of 54 years. His boyhood and youth were spent in Romeo and Vassar, Michigan. He entered the University of Michigan from Vassar high school in 1889 and was graduated in mechanical engineering with the class of 1893. Immediately afterward he became associated with Dean Cooley in special research work. In 1894 he accepted a position with the Whiting Foundry & Equipment Co., later the Whiting Corp., Harvey, Ill. There he was associated with George True and Harry Standart with whom he joined in 1898 to found the Northern Engineering Works, manufacturers of cranes, hoists and foundry equipment.

In 1894 he married Mary D. Thompson, a college classmate. Mr. Reid was a member of the American Society of Mechanical Engineers, and the Detroit Engineering society. Through his membership on the board of water commissioners he took a great interest in civic affairs.

Limits Travel of Hook

A new device for limiting the extent of upward travel of the hook on an electric crane operated by direct current motors has been brought out by the Cutler-Hammer Mfg. Co., Milwaukee. When the hoist block reaches the upper limit, it raises a counted balance weight and allows a weighted lever to drop, thus tripping the contactors. The latter disconnects the motor from the line and connects a resistor in the armature circuit of the motor, which acts as a self excited series generator and gives dynamic braking. Quick, accurate stops are claimed, since the breaking effort is independent of line conditions and of the position of the motor controller, and is proportional to the speed of the motor.

When the limit switch is in the tripped position, a by-pass circuit makes it possible, on reversing the controller, to lower the hoist block out of the limit position, and the counter-balance weight automatically resets the contactors. Arrangement may be made for manual or rope-operated reset instead of automatic reset, if necessary.

The limit switch also may be used with an alternating current motor, in which case two of the conductors are disconnected to stop the motor, but no braking effect is obtained, and minor changes in the limit switch and the controller are required for lowering the hoist block out of the limit position.

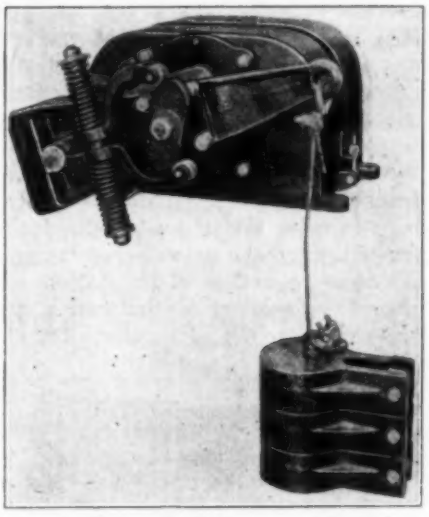
Appointed Sales Manager

Henry F. Russell, formerly of the Lumen Bearing Co. has been appointed sales manager of the Sumet Corp. and Cored Bar Corp., Buffalo, N. Y. The Cored Bar Corp. manufactures a wide range of various sized cored and solid bars cast from bronze bearing metal of the Sumet Corp.

To Handle Cranes

R. E. Ludwick, formerly connected with the Whiting Corp., Harvey, Ill., and F. J. Page, formerly Chicago district manager of the Milwaukee Electric Crane & Mfg. Co., Milwaukee, have established a sales office at 14 E. Jackson boulevard, Chicago, and will handle cranes and other material handling equipment.

The Cleveland Electric Tramrail division of the Cleveland Crane & Engineering Co., Wickliffe, O., has appointed the following companies representatives in their respective districts: The Kirkby Machinery Co., Toledo; the J. H. Overpeck Co., Pittsburgh, the A. D. Heath Machinery Co., Indianapolis; Julius Andrae & Sons, Milwaukee; George E. Coursey, Cincinnati, and the D. H. Braymer Equipment Co., Omaha, Nebr.



THE LIMIT SWITCH MAY BE USED FOR ALTERNATING OR DIRECT CURRENT MOTORS

Joins Selling Staff

Charles B. Wilson recently joined the selling staff of Phillips Isham, New York, merchant in pig iron, coke and other products. Mr. Wilson formerly was connected with Rogers Brown & Co. Later he joined Reed, Fears & Miller Inc., and on the acquisition of that company by Crocker Bros., joined the staff of the latter company.

Make Personnel Changes

G. W. Eichhoff, formerly district manager in charge of sales in the Chicago office of the Cleveland Electric Tramrail division of the Cleveland Crane & Engineering Co., Wickliffe, O., has been placed in charge of sales in the ceramic and paper industries. H. T. Florence, is in charge of sales in the rubber industry.

Move Cleveland Office

Young Brothers Co., Detroit, has moved its Cleveland office from 730 Engineers building to 1424 Guarantee Title building. C. G. Lisch is manager of the office which serves Ohio and western Pennsylvania.

Adams Foundry, 108 South George street, Rome, N. Y., is accepting congratulations on its ninetieth anniversary. The company was established in 1835.

Nominates Officers

T. J. Litle Jr., chief engineer, Lincoln division, Ford Motor Co., was nominated for president of the Society of Automotive Engineers at the semi-annual meeting held last month.

Other nominations were J. H. Hunt, General Motors Research Corp., for first vice president; G. W. Smith, chief engineer, Nash Motors Co.; O. W. Sjogren, professor of agricultural engineering, University of Nebraska; G. F. Crouch, vice president, Horace E. Dodge Boat Works; Arthur Nutt, chief engineer, Curtiss Aeroplane & Motor Corp., and C. O. Guernsey, chief engineer, automotive car division, J. G. Brill Co., for vice presidents, and C. B. Whittelsey, president, Hartford Rubber Works Co., for treasurer.

To Handle Limitator

The Pittsburgh Electric Furnace Corp. Pittsburgh, has taken over the sales and service of a demand limitator. This device is designed to limit total plant loads through the elimination of peak loads. The device is applicable to almost any type of load including electric melting furnaces, electric heating furnaces, motors, etc.

Faucet Sales Smaller

Sales of brass faucets in April were 263,551 pieces, compared with 313,267 in March and 339,036 a year ago. Orders shipped also fell off, being 398,594, compared with 554,565 a month earlier and 482,578 in April, 1924.

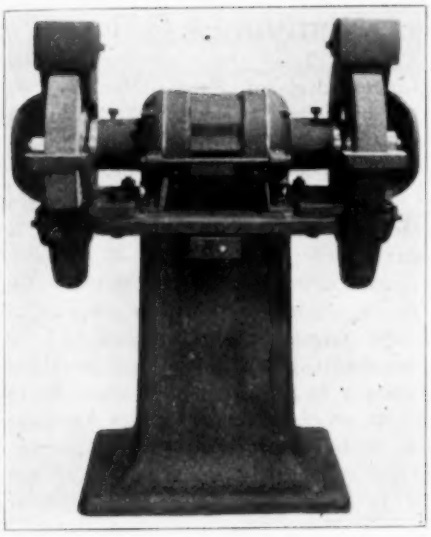
Receives Degree

The degree of doctor of science was conferred on Robert J. Anderson, consulting metallurgical engineer, Cleveland and Pittsburgh, by the Massachusetts Institute of Technology at the recent commencement.

Establish Branch Offices

Rogers Brown & Crocker Bros. Inc., has established headquarters at 21 East Fortieth street, New York. Philadelphia branch office is in the Pennsylvania building formerly occupied by Crocker Bros., and Boston branch office in the suite formerly occupied by Rogers Brown & Co. These changes became effective July first.

L. C. Wilson, formerly connected with the Pittsburgh office of the Republic Flow Meters Co., Chicago, has been placed in charge of the company's new branch office, 617 Engineers building, Cleveland.



THE DEVICE IS DESIGNED FOR HEAVY DUTY

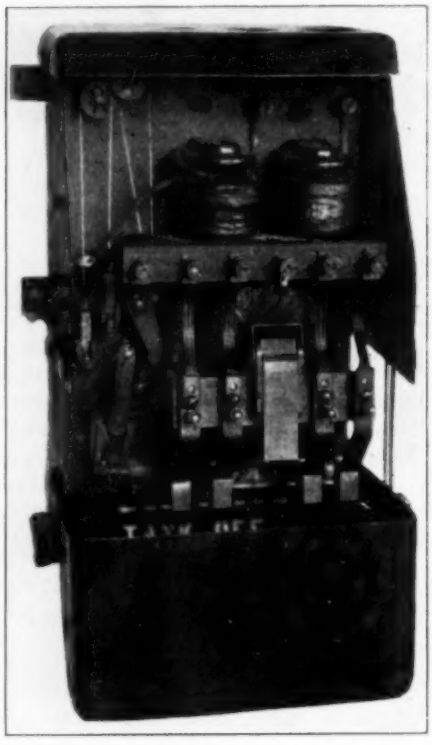
Grinder Is Ball Bearing

The electric floor grinder shown herewith was developed by the J. G. Blount Co., Everett, Mass. It is equipped with a 5-horsepower motor, the armature shaft operating in dust-proof, ball bearings. The motor runs at a speed of 1200 revolutions per minute. It is controlled by a push button conveniently located on the under side of the pan. The motor end shields are cast iron, turned with recesses and bolted directly to the frame. They are further secured by two longitudinal bolts at the rear and front. The end shield flanges are threaded into the ends of the end shields. The wheel flanges are machined all over. The wheel guards are of the safety exhaust type with adjustable nose pieces. Removable covers facilitate wheel changing. The work rests are substantial in design and fully adjustable. This grinder weighs approximately 1163 pounds.

Operates Oil Switch by Push Buttons

The Electric Controller & Mfg. Co., Cleveland, has developed a new, push button operated oil switch for starting squirrel-cage induction motors directly across the line. This device is controlled from one or more push button stations located at convenient points. The starting switch has four pairs of heavy contact fingers, three of which handle the main line in the case of three phase or two-phase, three wire motors, and the fourth handles the control circuit to the push button when the switch is arranged for no-voltage protection.

The starting switch has an accurate inverse time element temperature overload device consisting of two alloy wires, each attached at one end to an adjusting screw, and at the other end to a multiplying lever which operates a quick, make and break contact. The wire is connected across the secondary of a small current transformer. The gage of the expansion wire and the winding of the secondary of the transformer remain the same regardless of the horsepower ratings or voltage of the switch and the size of wire and number of turns



SWITCH PROTECTS THE MOTOR AGAINST INJURY

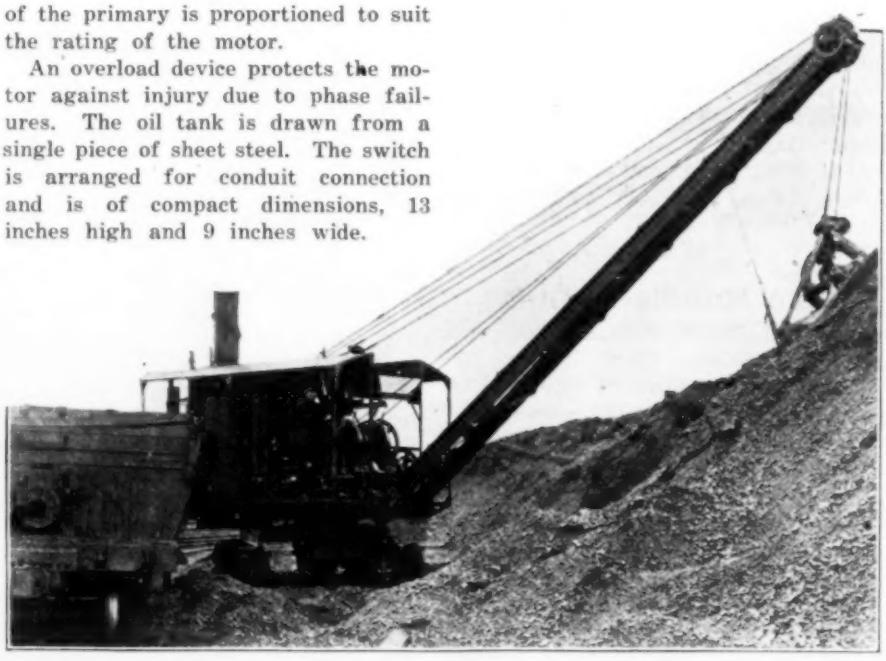
of the primary is proportioned to suit the rating of the motor.

An overload device protects the motor against injury due to phase failures. The oil tank is drawn from a single piece of sheet steel. The switch is arranged for conduit connection and is of compact dimensions, 13 inches high and 9 inches wide.

Crawler Crane Gives Greater Speed

The Industrial Works, Bay City, Mich., recently has introduced a new 10-ton crawling tractor crane. This crawler crane is similar in outward appearance to the former types of tractor cranes built by that company, but its design embodies many new engineering features such as split gears for propelling, increased speeds, double clutch mechanism, long tractor belts, etc. The most important of the new features is the system of split gears by which each tractor belt is controlled separately. Two, concentric, vertical, propelling shafts at the axis of revolution lead two independent, but concentric trains of spur and bevel gears, each operating one tractor belt. Each belt is controlled directly by two friction clutches and brakes in the revolving upperworks. This is an all gear drive from engine to sprockets with no chains in the mechanism. These features, it is claimed, make maneuvering in close quarters comparatively simple.

All speeds of the motor operated crane have been increased 25 per cent over other models made by this company. This crane may be equipped to operate with a steam engine, electric motor, gasoline motor or fuel oil engine of the diesel type to suit any operating conditions. It may be used for operating with clamshell or dragline bucket, electro-magnet, hook and block, or grapple. It is convertible into a shovel or a pile driver. The machine is designed to handle any equipment that operate on a boom.



SPLIT GEARS FOR PROPELLING FEATURES THIS CRANE

Introduces Grinding and Polishing Machine

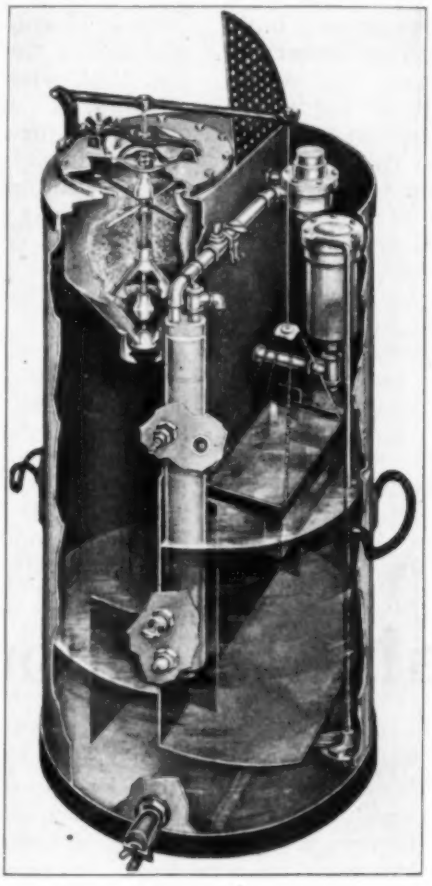
The Excelsior Tool & Machine Co., East St. Louis, Ill., recently has introduced an automatic grinding and polishing machine of ten wheel capacity. The machine is designed to grind and polish a variety of articles of uniform thickness which may be placed on a conveyor belt and carried under the grinding and polishing wheels at an approximate feed rate of 25 feet or more per minute.

The ball bearing wheel spindles are directly connected to 7½ horsepower motors mounted on vertical self-contained sliding frames which are accurately balanced and adjustable to any required pressure. The wheels are from 12 to 16 inches in diameter.

The feed drive arrangement for the conveyor belt and sprocket chain drive for the eccentric shaft, which vibrates the feed tables and feed belts about ¼ inch sideways, prevents straight line scratches and grooves in the wheels. The wheels also are set about 5 degrees out of line with the feed belt, which it is claimed, further assists the wheel in cutting. A view of the machine is shown in the illustration below.

Low Pressure Generator Is Portable

A small generator for producing acetylene at low pressure for welding and cutting recently has been developed by the Oxweld Acetylene Co., New York. This supplements a line of larger generators, a great many of which are used to supply pipe lines in shops doing cutting and welding. The new generator, which takes 35 pounds of carbide at one charge, may be transported readily from place to place. Empty, the generator weighs 210 pounds, the capacity being 35 pounds. A new principle of feed control is used which might be called a heavier-than-water float. A vertical partition, extending nearly to the bottom into a water seal, divides the generator shell. One side is gas tight and contains the carbide hopper at the top. The upper part of the other side contains gas regulating and protective devices, and an automatic carbide feed control. Generation of the first acetylene causes water to rise on this side of the partition high enough to all but submerge a pan full of water, hung to a control lever. This pan normally acts as a weight acting counter to a spring, but as the water rises about it, its apparent weight is diminished and the carbide hopper valve is closed by the action of the spring. As acetylene is drawn off, water rises in the gas compartment and correspondingly lowers under the float, relieves some of the buoyancy under the water pan, which, gathering weight with the receding water, depresses the spring and allows a small amount of carbide to drop into the generator, and restore equilibrium conditions. A sectional view of the machine is shown in the accompanying illustration.



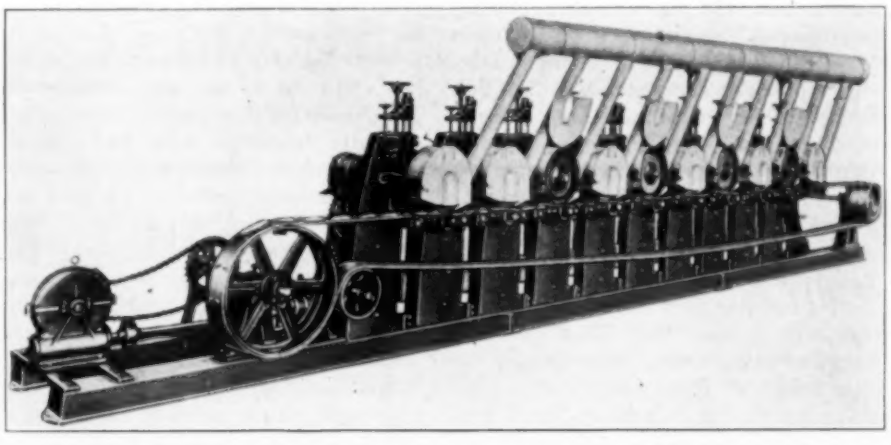
THE GENERATOR WEIGHS 210 POUNDS WHEN EMPTY

THE GUARDS MAY BE FITTED TO THE MACHINE

Install Protection Guards

Adequate protection devices are a necessity in any grinding room. The accompanying illustration shows a floor grinder fitted with an eye shield, grinding wheel, and belt guard. These devices were developed by the Surty Mfg. Co., Inc., Chicago. The eye shield at the left is mounted on an adjustable rod so that it may be secured conveniently. The one at the right is carried on a flexible arm which affords instantaneous adjustment. The shields are glass, 4½ x 6 inches, securely mounted in frames.

The wheel guards are adjustable by conveniently located bolts, while an opening for connection to an exhaust system also is provided. As the illustration shows, the ends of the arbor and nut are covered to preclude the possibility of the operator's clothing becoming caught. The belt guard is sheet metal and is adjustable. It may be opened readily and it is high enough to protect the operator in case of belt breakage.



THE ARTICLES ARE PLACED ON THE BELT AND CARRIED TO THE WHEELS

Equipment Inquiries Growing

Numerous Builders Find Greater Interest in Their Products—Price Cutting Hurts Market for Cranes—May Exports Show Marked Decline

WHILE sales of foundry equipment have increased perceptibly in the Pittsburgh territory during the past two weeks, business in a majority of the distributing centers is experiencing a continuation of the lull which previously was noted. The delay in buying is attributed to seasonal influences and to the fact that many are away on vacations, this condition being the usual development during two or three summer months. A good volume of inquiries is being brought out in several lines, one manufacturer reporting that during the past two weeks his company has noted a gratifying increase in inquiries, the prospective business coming from all sections of the country where foundries are located. The same firm also has materially increased the number of proposals outstanding in the same period. A number of manufacturers have realized a greater volume of business thus far this year than during the same period in 1924, and feel that, everything considered, the market is on the upgrade.

Demand for cranes for use in the foundry industry is light, and price cutting has left this market in an unhealthy condition. It is the contention in some quarters that several crane manufacturers take orders at absolutely cost prices, and that when their shops are filled with a fair amount of work, they attempt to secure orders at a price that will give them a fair profit. About this time, other manufacturers find their shops running at a low capacity, and follow the same method of keeping the plant running, taking business at cost prices. This results in a cycle which keeps the prices so low that there is little chance for any of the companies to make money.

Exports of foundry and molding equipment showed a decrease in May, the value of exports being $65,282 as compared with $95,705 in April. A slight decrease also was noted over the corresponding month in 1924 when the value was $68,368. The exports for 11 months ended May was $601,448 as compared with $316,650 during the corresponding period last year the gain in the last 11 months being $284,798.

Sellers Await Vacationists' Return

SLUGGISHNESS continues to characterize the equipment demand in the New York metropolitan district. A fair amount of inquiry prevails, but much of it is of a rather indefinite character, and orders are small and scattered. This situation is a reflection of continued light operations, jobbing plants running around 30 to 40 per cent, although some specialty shops doing work for railroads are maintaining a better average. Lack of new construction also is having its effect on the market for equipment. Two large projects are contemplated, the land for one already having been purchased. However, both are in a preliminary stage, so that little action in the way of equipment is expected for sometime. Both projects are contemplated by companies already having existing plants. The J. C. Williamson Foundry Co., Bellwood, Pa., plans the erection of a foundry to replace the building recently badly damaged by fire, with a loss of $100,000. Keen competition is making low prices in some lines, especially in conveying equipment. The International Heater Co., Utica, N. Y., has purchased vibrators and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland. The Philadelphia Hardware & Malleable Iron Works, Inc., Philadelphia, has secured dust arrester equipment and the Pyrene Mfg. Co., London, England, has purchased sand-blast equipment from the Pangborn Corp., Hagerstown, Md. Edward G. Budd Mfg. Co., Philadelphia, has ordered tumbling mill equipment from the W. W. Sly Mfg. Co., Cleveland.

Pittsburgh Brightens

EARLY July found the sellers of foundry equipment in the Pittsburgh area, and the territory reached by them, in receipt of a fair number of orders together with some attractive inquiries. The Standard Sanitary Mfg. Co., is installing three cupolas made by the Whiting Corp., Harvey, Ill., in its Allegheny, Pa., plant; two 96-inch, and one 90-inch, together with a large sand-blast installation, which it is understood is being put in by the Pangborn Corp., Hagerstown, Md. The Iron City Sanitary Mfg. Co., Zelienople, Pa., also has installed sand handling equipment, representing an investment of about $80,000, the order going to Heyl & Patterson, Pittsburgh. The orders for cupolas, blowers and other sundry equipment doubtless will come along within a week or two. The Reliance Steel Casting Co., Pittsburgh, ordered a tumbling mill from the J. S. McCormick Co., Pittsburgh, which dealer also reports the sale of other small equipment and supplies. Brass foundries, many of which were entirely or practically shut down for a period of weeks, are starting up and find themselves in need of supplies, small equipment, etc. The Star Brass Co., Perkasie, Pa., is expected to buy equipment for a new foundry soon, and the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., which has let the contract for 800 tons of steel for a brass foundry at Linhart, Pa., doubtless will have to buy considerable equipment for that point. Some of the specialty foundries have been buying miscellaneous hoist and conveying equipment and pressure burners and combustion control apparatus has been ordered by the Mystic Iron Works, Boston, from the American Heat Economy Bureau, Pittsburgh, which also received a similar order from the Frodingham Iron & Steel Co., Consett, England. The Oakley Foundry Co., Cincinnati, O., is constructing an addition and may buy some miscellaneous

equipment. Molding machine manufacturers are exceedingly sanguine over the outlook. Collections are good, their customers are more cheerful than they have been in some time and numerous projects are known where from two to five machines will be required. Inquiries by telephone for pairs of machines are more numerous and mail inquiries too are heavy. Sales recently made by the Herman Pneumatic Machine Co., Zelienople, Pa., include large roll over machines to the Guerney Heater Mfg. Co., Framingham, Mass., the United States Radiator Corp., Detroit and the Stockham Pipe & Fittings Co., Birmingham, Ala. Single machine orders recently were received from the following: Eddy Valve Mfg. Co., Waterford, N. Y., the Fox Furnace Co., Elyria, O., the Illinois Malleable Iron Co., Chicago and the Ditella Co., Buenos Aires, South America. Sand-blast equipment has been purchased by the Ingersoll-Rand Co., Athens, Pa., from the Pangborn Corp., Hagerstown, Md., and the Richmond Radiator Co., Uniontown, Pa., has secured shakeout bails, vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland. Crane sales have been few to foundries recently but the Youngstown Foundry & Machine Co., Youngstown, O., wants five, one each 10, 15 and 25-ton with 50-foot span and one 5-ton with 40-foot span and a 5-ton with 30-foot span.

Sales Drop In New England

SALES of foundry equipment have dropped lower and lower, during the last two weeks scarcely any sales being made. Two Connecticut foundries bought three or four molding machines each and a Massachusetts foundry bought two molding machines. Tumbling mill equipment has been sold to the Portland Stove Foundry Co., Portland, Me., by the W. W. Sly Mfg. Co., Cleveland, and the Westinghouse Electric & Mfg. Co., Springfield, Mass., has secured sand-blast equipment from the Pangborn Corp., Hagerstown, Md. Inquiry includes a large annealing oven for a Connecticut foundry which is expected to be placed during the month. Sales of foundry supplies including molding sand have been heavy and the reports of close observers indicate that the rate of melt in the district is improving gradually. The report of this district in the June 15 issue referred to the sale of 20 cupolas. This should have read 20 molding machines.

Cleveland Market Lags

DULLNESS continues in the market for foundry equipment in the Cleveland territory, due, it is thought, to seasonal conditions and to the fact that many are away on vacations. This condition is experienced yearly and lasts, in most cases, until the early part of September. Inquiries are not as heavy as was the case a month ago, and sales of large amounts of equipment are practically nil, foundrymen buying on a basis of immediate needs. The business for the first half of the year, as reported by a number of manufacturers, was better than that realized during the same period in 1924, and men of the industry see no reason why this betterment should not be distributed over the remainder of the year. Tumbling mill equipment has been purchased by the Rockwood Stove Works, Rockwood, Tenn., the Cadillac Motor Car Co., Detroit, the Gartland-Haswell-Rentschler Foundry Co., Dayton, O., and Kuhns Brothers, Dayton, O., from the W. W. Sly Mfg. Co., Cleveland. Vibrator and shakeout equipment has been sold to the Worthington Pump & Machinery Corp., Elmwood Place, O., the Elmwood Casting Co., Cincinnati, and the XXth Century Heating & Ventilating Co., Akron, O., by the Stoney Foundry Engineering & Equipment Co., Cleveland. The Ohio Brass Co., Mansfield, O., has purchased sand-blast equipment from the Pangborn Corp., Hagerstown, Md. The Mayor Fuel Saving Furnace Co., Cleveland, has received a repeat order from the Reliance Steel Casting Co., Pittsburgh, for two furnaces to be attached to mold drying ovens. The Browning Co., Cleveland, also has purchased an oven from the same manufacturer for installation at its foundry at Ravenna, O. The Doehler Die-Casting Co., New York, has purchased a special machine from the Standard Sand & Machine Co., Cleveland, to break up asbestos molds.

Chicago Market Dull

INQUIRIES and orders for foundry equipment in the Chicago district continue to feel the effect of the summer slump. The Zimmerman Steel Co., Bettendorf, Ia., and the Holt Mfg. Co., Peoria, Ill., have purchased sand-blast and dust arrester equipment and the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has placed a repeat order for sand-blast equipment from the Pangborn Corp., Hagerstown, Md. The Holmes Foundry Co., Port Huron, Mich., and the American Steel Foundries, East St. Louis, Ill., have secured vibrators and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland. The Peoria Malleable Castings Co., Peoria, Ill. has purchased tumbling mill equipment, the Economy Enameling Co., Quincy, Ill., has ordered a sand-blast room with necessary dust arrester equipment and the More-Jones Brass & Metal Co., St. Louis, Mo., the Wolverine Brass Works, Grand Rapids, Mich., and the Saginaw Malleable Iron Co., Saginaw, Mich., have bought tilted mills of the positive pressure type from the W. W. Sly Mfg. Co., Cleveland.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Star Brass Co., Perkasie, Pa., plans erection of a new foundry building.

Oakley Foundry Co., Cincinnati, has plans for constructing a foundry. (Noted April 15).

Copper Welding Corp., Pittsburgh has leased a foundry on Wayne street for a new plant.

Schmandt Foundry Co., Detroit, has been incorporated with $25,000 capital to conduct a foundry and machine shop.

Dill Foundry Co., Rushville, Ind., has taken bids for a 1-story, 140x180-foot foundry. William Dill is manager.

Lindell Die Casting, plant Lansing, Mich., has installed equipment to increase production schedules.

Buckeye Machine Co., Lima, O., P. O. 304, Detroit, contemplates leasing a plant in the Detroit district.

William Krodell Foundry, 1820 Baldwin street, Waterbury, Conn., plans constructing 1-story foundry for manufacture of brass, bronze and aluminum castings.

The Ypsilanti Foundry Co., Ypsilanti, Mich., manufacturer of piston rings, has awarded a contract for a new machine shop to the Austin Co., Cleveland.

Geier Corp. of Illinois, 209 South La Salle street, Chicago, has been incorporated to manufacture machine tools, dies, models and patterns with $25,000 capital by Claud D. Raber

and H. J. Hickering. Cassels, Potter & Banrley, 1040 The Rookery, are correspondents.

The General Die Castings Co., Reading, Pa., has completed the first of three new units for the production of die castings. (Noted June 15).

Buckey Traction Ditcher Co., Findlay, O., has awarded contract to Algo Bros., for constructing 1-story, 100x175-foot plant. (Noted June 15).

Erie Malleable Iron Co., Erie, Pa., plans establishment of a box department at its West Twelfth street plant. A threadless conduit fitting will be the product of the new department.

Supervalve Co., Indianapolis, has been incorporated with $25,000 capital to do a general foundry and machine shop business, specializing in valves, by Irving M. Fauvre, Julian M. Fauvre and Paul T. Rockford.

Marshall Brass & Bronze Foundry Co., Newark, N. J., has been incorporated for $50,000 by George H. Marshall, Joseph A. Segall, and Samuel Kerzner, with Frankel & Distler, Newark, as attorneys.

General Steel Foundries, Newark, N. J., has been incorporated with $300,000 preferred and 6000 shares no par common, by Garfield Kilpatrick, East Orange; Nathan Bilder, South Orange and John H. Meister, Irvington. Bilder & Bilder, Newark, are attorneys.

B. F. Perkins & Sons, Inc., Holyoke, Mass., have awarded contracts to Lockwood, Greene & Co., Boston, engineers, for preparing plans for a 2-story pattern storage building, 80x150-foot and 1-story machine shop, 80x260 feet at Willimansett, Mass.

Hoosick Foundries, Hoosick Falls, N. Y., has been incorporated with 20,000 shares $10 par value preferred and 30,000 no par value common by H. Burden, F. L. Hilton and C. H. Marvin, with T. Garrett, Jr., 15 Broad street, New York, as attorney.

Cornine-Hakanson Die-Casting Co., Inc., 402 East 152nd street, New York, has been organized to manufacture alloy dies and castings. Marshall Cornine, former sales manager of the Republic Die Casting Co. is president of the new company.

Wonder Furnace Co., Neantic, Ill., manufacturer of domestic heating apparatus, has purchased the plant of the Pan-American Automobile Co., Decatur, Ill. where it contemplates installation of equipment including a 20-ton cupola.

Massey-Harris Harvester Co., Inc., Batavia, N. Y., contemplates opening a manufacturing plant at Hutchinson, Kans. The machines now are assembled here but the parts are manufactured in the East. Percy E. Verity, general superintendent, recently visited Hutchinson to inspect possibilities of a plant here.

Reorganization of the James Stewart Mfg. Co., Woodstock, Ont., manufacturer of stoves, furnaces, and other products, is in process. The company recently was involved in involuntary bankruptcy proceedings. E. Izzard is former manager of the company. A new company is to be formed.

Holland Furnace Co., Holland, Mich., has awarded the general contract to Clement Construction Co., Bethlehem, Pa., for a 1 and 2-story, 140x500-foot office and plant building of concrete and steel. A. H. Landwehr is treasurer and general manager of the Holland company.

Mall Tool Co., 7159 Stony Island avenue, Chicago, has been incorporated with $25,000 capital to manufacture dies, tools, patterns and machinery by Arthur W. Hall, A. L. Heald, and R. M. Gaston. Krauss, Goldman & Allshouse, 5 South Wabash avenue, are correspondents.

Glascock Stove & Mfg. Co., Greensboro, N. C., has awarded contracts to the Carolina Steel & Iron Co. for fabricating and erecting steel in a 1-story, 80x160-foot foundry, 1-story, 32x80-foot nickel plating department and a 2-story pattern department and storage building.

Plant and equipment of the Hilton Brass Foundry, Hilton, N. J., was put up at public auction June 29. The property consisted of about ½-acre of ground with cement block and corrugated metal warehouse buildings. S. Van Poznak & Son, 207 Market street, Newark, N. J., were the auctioneers. John E. Sandmeyer was the receiver.

Glenside Metal Foundry Co., 208 Butler street, Reading, Pa., has been incorporated with William McKinney as president for the manufacture of metal products, especially aluminum.

J. C. Williamson Foundry Co., Bellwood, Pa., contemplates the reconstruction of its plant, which recently suffered approximately $100,000 damage by fire.

Wolverine Brass Works, Grand Rapids, Mich., has awarded contracts to I. K. Parsons & Sons, 308 Jefferson street, southeast, for a 1-story top addition to its boiler house. Osgood & Osgood, Monument square building, are architects. L. A. Cornelius, 620 Monroe avenue, is president of the Wolverine company. (Noted April 1).

Wanner Malleable Castings Co., Hammond, Ind., operating plants at Hammond, Ind., and Beloit, Wis., contemplates building air furnaces at its Beloit works. The new unit will require about 100 tons of steel and will have a stack about 150 feet high. The furnaces are expected to be put into operation in August or early September.

The Draper Corp., Hopedale, Mass., large manufacturer of textile machinery, has placed an order with the Paxson Co., Providence, R. I., and Philadelphia, for a cupola with a capacity of 20 tons an hour. The cupola shell will have an inside diameter of 91 inches which will be lined down to 72 inches. This is part of an extensive rebuilding plan planned by the Draper Corp.

Hammond Brass Works, Hammond, Ind., has placed a contract with the Austin Co., Chicago, for the design and construction of a brass foundry on Summer street, replacing the plant damaged by fire. The new plant will be 90 x 320 feet with approximately 30,000 square feet of floor space. The company manufactures brass valves and specialties. J. I. Lammering is vice president. (Noted July 1).

The Western Foundry Co., 3634 South Kedzie avenue, Chicago, has changed its name to the General Foundries Co. Butler, Lamb, Foster & Polk, 53 West Jackson boulevard, Chicago, are correspondents for the company. The company operates gray iron and aluminum foundries, having seven foundries. It also operates the Illinois Foundry & Specialty Co., Chicago Heights, Ill.

An extension to the main foundry building and increased space for cleaning room and shipping platform just have been completed by the Chicago Steel Foundry Co., Chicago, manufacturer of electric furnace steel castings. A 10-ton, double chamber, electric annealing furnace was purchased from the Electric Furnace Co., Salem, O., the unit now being installed. David Evans is president of the Chicago company.

Improvements costing about $127,000 are being made by the Maynard Electric Steel Casting Co., Milwaukee. An electric furnace has been purchased for a new foundry addition, 200 feet long, making the building 125x620 feet in size. A pattern storage addition, 60x60 feet, is being built and foundations have been laid for a new building 100x400 feet, to be erected later. The plant is now four to five times as large as when the Wabisczewski interests took it over nine years ago.

A tract of land has been purchased by H. S. Getty & Co., Inc., 1539 Cabot street, Philadelphia, manufacturer of brass and bronze hardware, for marine, railroad, automotive and building industries. The first unit of a 2-story, 40x80 foot plant, with 1-story, 30x75-foot brass foundry adjoining, now is being constructed. The buildings are being erected at Tenth and Thayer streets and are to be ready for occupancy about Sept. 1. Expansion of equipment also is planned. Harry S. Getty is president of the company.

The Acme Stamping & Brass Works, Zeeland, Mich., which was incorporated in March for $25,000 and which now has a floor space of approximately 10,000 square feet devoted to making aluminum and brass castings, etc., is planning an addition which will double the capacity of the plant. John Glupker, formerly with the Superior Foundry Co., Holland, Mich., and J. A. Elenbaas, formerly with the Michigan Star Furniture Co., Zeeland, are the principal stockholders, the former serving as superintendent and the latter as secretary-treasurer.

Replacement of the main foundry and auxiliary buildings of the Beloit Foundry Co., at South Beloit, Ill., a suburb of Beloit, Wis., which was badly damaged by fire two weeks ago, will be started at once. The pattern shop and vault of the old plant was saved, but valuable patterns owned by machinery manufacturers of Beloit and Janesville, Rockford and Freeport, and other cities nearby, were burned in the foundry and core room. The loss is about $90,000, including the patterns. The plant was an old one, originally being that of the former Thompson Plow Works. J. A. Janvrin is president, and J. E. Gosline, vice president and manager of the works. (Noted July 1).

Wausau Foundry & Machine Co. has been organized at Wausau, Wis., with $100,000 capital to take over the business and property for many years conducted as the Wausau Foundry & Machine Works. Recently, upon the death of the founder, the business was placed on the market and the machinery, equipment, materials, stock, good will, etc., was purchased by the Wausau Iron Works, a large fabricating company, which in turn has disposed of the property to Edward C. Helmke and associates. The old building will be razed and a new shop erected on a new site at Thirteenth avenue and West street. Henry H. Schneider and Otto Kolbe are associated with Mr. Helmke in the new enterprise. (Noted April 15).

George Ford, who was general manager of the works at Stoughton, Wis., of the Moline Plow Co. until the property went into liquidation some time ago, has taken a five-year lease of the foundry department and is organizing a new Wisconsin corporation to operate the plant as a commercial foundry. The city of Stoughton bought the entire local Moline plant in April by a $100,000 bond issue. So far two of the main buildings have been leased, and now the foundry unit has been taken over. Mr. Ford is an experienced foundryman and before becoming general manager of the Stoughton works was in charge of the foundry department. Local capital is taking a part in the new corporation, which expects to get started by Aug. 1.

New Trade Publications

DIE SETS—The Danly Machine Specialties, Inc., Chicago, has issued a 12-page bulletin describing the operations used in producing precision die sets. Unique methods in gating and pouring castings in the foundry are used to maintain a low cost per pound.

Still Waters Run Deep, but They SOON BECOME STAGNANT

ANYONE who has been faced by the necessity for replacing a machine part, or has been obliged to seek a stove repair, or a base for a broken pump that is needed in a hurry, knows exactly how difficult it can be to locate a nearby foundry that can meet the need. Except for those who are connected with the foundry business, how many in your own locality, know that you make castings? This strange lack of ability to make an impression on the public mind, the entire absence of an advertising sense is one of the greatest handicaps in the foundry business today. Only about one foundry in a hundred makes known to the buying public its ability to meet the demand for certain classes of castings.

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THIS lack of advertising ability is not confined to the general jobbing trade. In fact it sometimes makes itself evident among speciality shops. I have encountered numerous cases where it has been impossible even to locate the makers name on machines with which I have come in contact. In fact this lack of a maker's name or mark probably gave rise to the impression, quoted some time ago as the height of dumbness; "He was so dumb he thought the world's greatest inventor was an Irishman named Pat Pending." How many times in your own experience have you sought the makers name on some piece of foundry equipment, only to find it absent, or so well concealed as to be practically non-existent?

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IN THE present age, no one can neglect the proper exploiting of his product and expect to prosper or even continue to exist. Advertising in some form is necessary as a preliminary step in the sale of any commodity. All this may seem far-fetched, particularly as applied to a product such as castings; but look about you. In these rather lean days, who is getting the major portion of the castings orders? Is it not that shop which has made itself known either through personal contact, letters, or the advertising pages of some publication? I recall, many years ago a small foundry in a western town always had plenty of business, although two jobbing shops in the same county constantly were changing hands and finally went out of business. The foundry which was successful, and now, by the way it is making a small size standard farm power engine in addition to its jobbing work, carried small reader ads, sprinkled among the personal items in the two county papers. These advertisements featured the thought, "let Flaherty fix it" and the constant repetition of this thought was so firmly implanted in the minds of the householders, farmers and small manufacturers that they always did—let Flaherty fix it. Occasionally they kicked on the charge that was made, for this little shop never took a job without making a profit, but the habit was formed and the trade went to the foundry that went after the business.

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ADVERTISING for the foundry need not mean billboards stretching along the state highways, nor full pages in the Saturday Spoofer. For the shop seeking local business it may consist of personal contact, supplemented by occasional letters and supported against the escape of unexpected new prospects by local newspaper advertising, based upon the character of work sought. Where work may be handled from large interests in other localities, some form of publication advertising, based upon the character of work sought, should be used. This advertising should feature quality of product, ability to deliver and the commercial reputation of the advertiser. But always stick closely to the truth. Remember the colored poker player who remarked, "Say, niggah, cayn't yu play hones'? Ah knows what kyards ah done dealt yu."

Phineas, Jr

P. T. Barnum Says!

BE careful to advertise it in some shape or other, because it is evident that if a man has ever so good an article for sale, and nobody knows, it will bring him no return.